Arlington Basin Groundwater Management Plan

December 2011

WESTERN MUNICIPAL WATER DISTRICT

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3-D model	three-dimensional hydrostratigraphic model
1969 Western Judgment	Judgment in *Western Municipal Water District of Riverside County et al., vs. East San Bernardino County Water District* et al.
AB	Assembly Bill
AF	acre-feet
AFY	acre-feet per year
ASR	aquifer storage and recovery
AWQ	Ambient Water Quality Database
Basin Plan	Water Quality Control Plan for the Santa Ana Basin
BMO	Basin Management Objective
CASGEM	California Statewide Groundwater Elevation Monitoring
Corona	City of Corona
DEH	Riverside County Community Health Agency's Department of Environmental Health
DPH	California Department of Public Health
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EC	Existing Conditions
EPA	United States Environmental Protection Agency
GPS	global positioning satellite
GV	Groundwater Vistas, Version 5
GWMP	groundwater management plan
Home Gardens	Home Gardens County Water District
InSAR	Interferometric Synthetic Aperture Radar
IRP	integrated resources plan
IRWMP	integrated regional water management plan
JPA	Joint Powers Agreement
LAFCO	Local Agency Formation Commission

MCL	maximum contaminant level
mgd	million gallons per day
mg/ L	milligrams per liter
MOU	Memorandum of Understanding
msl	mean sea level
Metropolitan	Metropolitan Water District of Southern California
N	nitrogen
NPDES	National Pollutant Discharge Elimination System
OCWD	Orange County Water District
OWOW	One Water One Watershed – Santa Ana Watershed Integrated Regional Water Management Plan
Plan Area	area covered by the Arlington Basin Groundwater Management Plan
ppm	parts per million
RAGFM	Riverside-Arlington Groundwater Flow Model
RCFCWCD	Riverside County Flood Control and Water Conservation District
RO	reverse osmosis
RPU	Riverside Public Utilities
RWQCB	Santa Ana Regional Water Quality Control Board
RWQTP	Regional Water Quality Treatment Plant
SABRINA	Santa Ana Basin Relational Information Network Application Database
Santa Ana River Judgment	Judgment in *Orange County Water District vs. City of Chino et al.*
SARI	Santa Ana Regional Interceptor
SAWDMS	Santa Ana Watershed Data Management System
SAWPA	Santa Ana Watershed Project Authority
SB	Senate Bill
SMCL	secondary maximum contaminant level
SVOCs	semi-volatile organic compounds
SWP	State Water Project
SWRCB	California State Water Resources Control Board

TDS	total dissolved solids
USGS	United States Geological Survey
Valley District	San Bernardino Valley Municipal Water District
Western	Western Municipal Water District
WRCRWA	Western Riverside County Regional Wastewater Authority
WRCRWTP	Western Riverside County Regional Wastewater Treatment Plant

1 INTRODUCTION AND BACKGROUND

1.1 PURPOSE OF THE GROUNDWATER MANAGEMENT PLAN

The goal of this Groundwater Management Plan (GWMP) is to provide a planning framework to operate and manage the groundwater basin in a sustainable manner to ensure a long-term reliable supply for beneficial uses among all stakeholders in the basin.

The purpose of this GWMP, including development of the plan and the plan document itself, is to inform the public of the importance of groundwater to the Arlington Basin and the challenges and opportunities it presents; develop consensus among stakeholders on issues and solutions related to groundwater; build relationships among stakeholders within the Arlington Basin and with local, state, and federal agencies; and define actions for developing project and management programs to ensure the long-term sustainability of groundwater resources in the Arlington Basin. This GWMP provides action items that, when implemented, are designed to optimize groundwater levels, enhance water quality, and minimize land subsidence.

1.2 DESCRIPTION OF THE GROUNDWATER BASIN AND PLAN AREA

The Arlington Basin GWMP area (Plan Area) is the portion of the Riverside-Arlington Groundwater Subbasin (Subbasin Number 8.2-03), as defined by the California Department of Water Resources' (DWR) Bulletin 118-03 (DWR, 2003), that is outside the boundaries of the Riverside Basin (both North and South), as defined by *Western Municipal Water District of Riverside County v. East San Bernardino County Water District*, County of Riverside Superior Court No. 78426 (1969) (1969 Western Judgment). The Plan Area is shown on Figure 1.1. The Plan Area boundaries as defined by Bulletin 118-03 are used to identify the alluvial aquifer system and to be consistent with statewide planning efforts. The Plan Area boundary between the Arlington Basin and the Riverside Basin is defined by the 1969 Western Judgment and is used to maintain consistency with existing management structures defined in that document and in later planning efforts. Areas within the northern portion of the DWR-defined Riverside-Arlington Basin and inside the 1969 Western Judgment-defined Riverside Basin are included in the Riverside Basin GWMP (WRIME, 2011a. Overlying municipalities are shown on Figure 1.2 and include Riverside and a small portion of Corona. The Plan Area is entirely within Riverside County. Water agencies serving areas overlying the Plan Area are shown on Figure 1.3 and include the City of Corona (Corona), Riverside Public Utilities (RPU), and Western Municipal Water District (Western). Home Gardens County Water District (Home Gardens) is just beyond the southwestern boundary of the Arlington Basin in the adjacent Temescal Basin.

Plan Area

Arlington Basin Groundwater Management Plan

2010

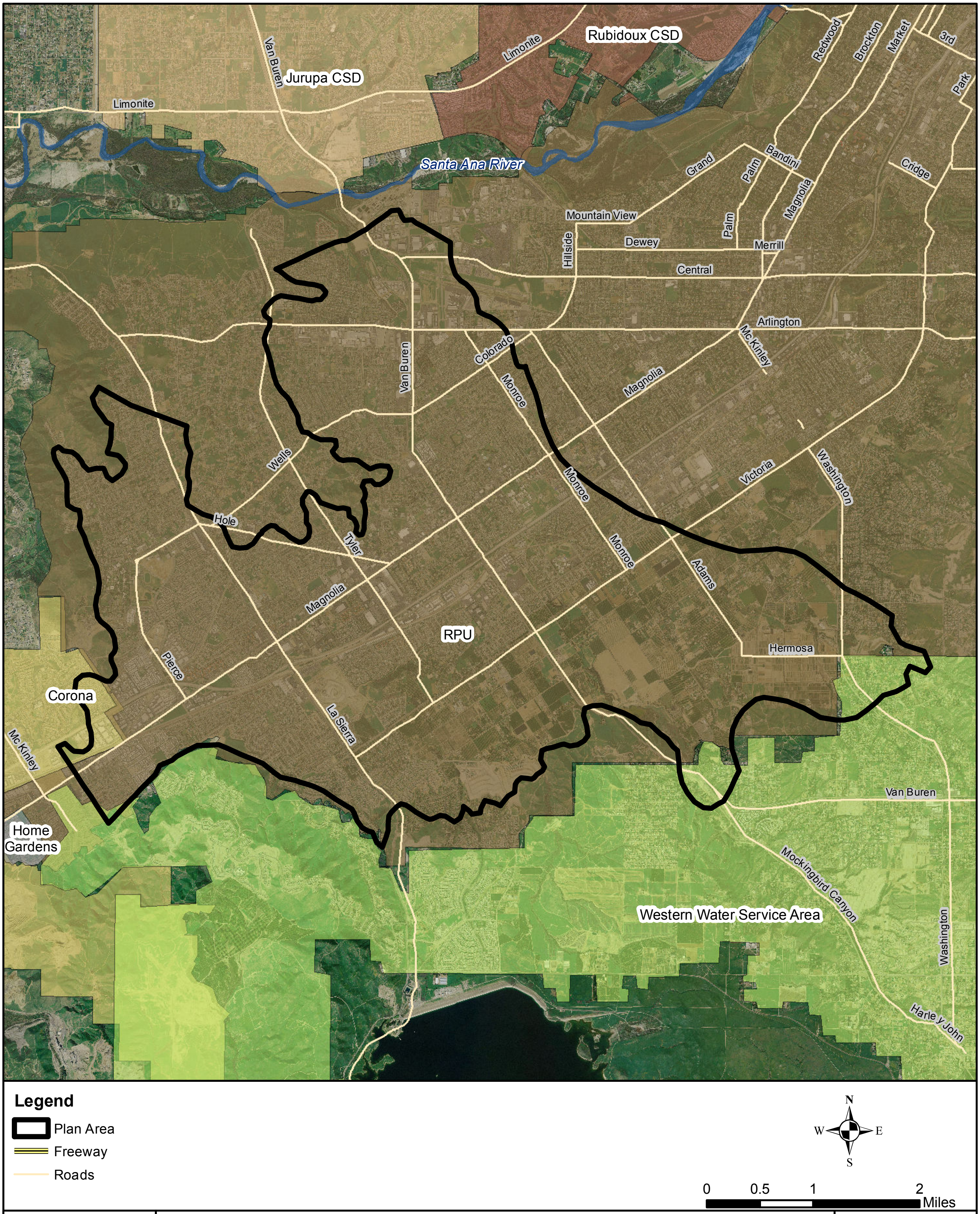
Figure 1.1

Municipalities

Arlington Basin Groundwater Management Plan

2009

Figure 1.2



WESTERN MUNICIPAL WATER DISTRICT

Water Agencies

Arlington Basin Groundwater Management Plan

2009

Figure 1.3

1.3 GROUNDWATER MODEL

A groundwater model was developed to assist in the development of this GWMP and to guide future groundwater planning efforts. The Riverside-Arlington Groundwater Flow Model (RAGFM) is a saturated groundwater flow model constructed using the U.S. Geological Survey (USGS) groundwater flow code MODFLOW-2000 (Harbaugh, 2000) and the pre- and post-processor program Groundwater Vistas (GV) Version 5 (Rumbaugh and Rumbaugh, 2007). The groundwater model is a tool for improving the understanding of the groundwater basin and the potential benefits and impacts of proposed water supply planning scenarios.

The Riverside-Arlington Groundwater Flow Model area covers 95.5 square miles (mi^2), consisting of 23.2 mi^2 in the Arlington Basin, 65.3 mi^2 in the Riverside Basin, and 7 mi^2 in the Rialto-Colton Basin. This area is modeled with up to three layers (one layer in the Arlington Basin) with 182,700 cells per layer, representing, from top to bottom:

1) Coarser alluvium and river deposits along the Santa Ana River
2) Shallower alluvium with higher conductivities
3) Deeper alluvium with lower conductivities

The model simulates hydrology for the 1965 to 2007 time period, which includes normal, wet, dry, and extended drought conditions. For comparison to proposed water supply planning scenarios, an Existing Conditions baseline scenario was developed, representing 2007 conditions, plus 8,200 AFY of groundwater production by Flume Wells in the Riverside Basin.

Based on the overarching goal of operating the groundwater basin in a sustainable manner for reliable supply for beneficial uses, this GWMP develops basin management objectives (BMOs) (See Section 5) and elements (See Section 6) that provide targets and actions to meet that goal. The groundwater model is used to investigate the future impact of current and projected operations relative to the goal and BMOs and to investigate the ability of hypothetical mixes of potential projects to move the basin closer to meeting the goal and BMOs. A description of this effort is provided in Section 7.1.2. Additional details on the RAGFM are described in *Riverside-Arlington Groundwater Flow Model (RAGFM) Model Development and Scenarios* (WRIME, 2011a).

1.4 OVERVIEW OF WATER REQUIREMENTS AND SUPPLIES

The Plan Area covers 14,730 acres (approximately 23 mi^2) and is extensively developed. Land use is approximately 68% urban, 13% undeveloped or vacant, 2% irrigated parks, and 17% irrigated agriculture (Southern California Association of Governments, 2005), as shown on Figures 1.4a and 1.4b. Urban areas include a portion of the City of Riverside, a very small portion of Corona, and urbanized unincorporated areas within Riverside County. Agricultural use is predominantly citrus groves and wholesale nurseries.

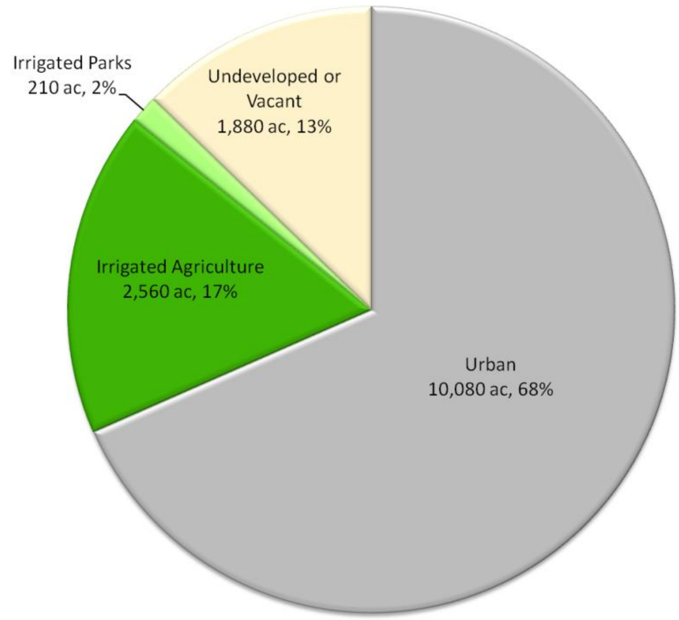
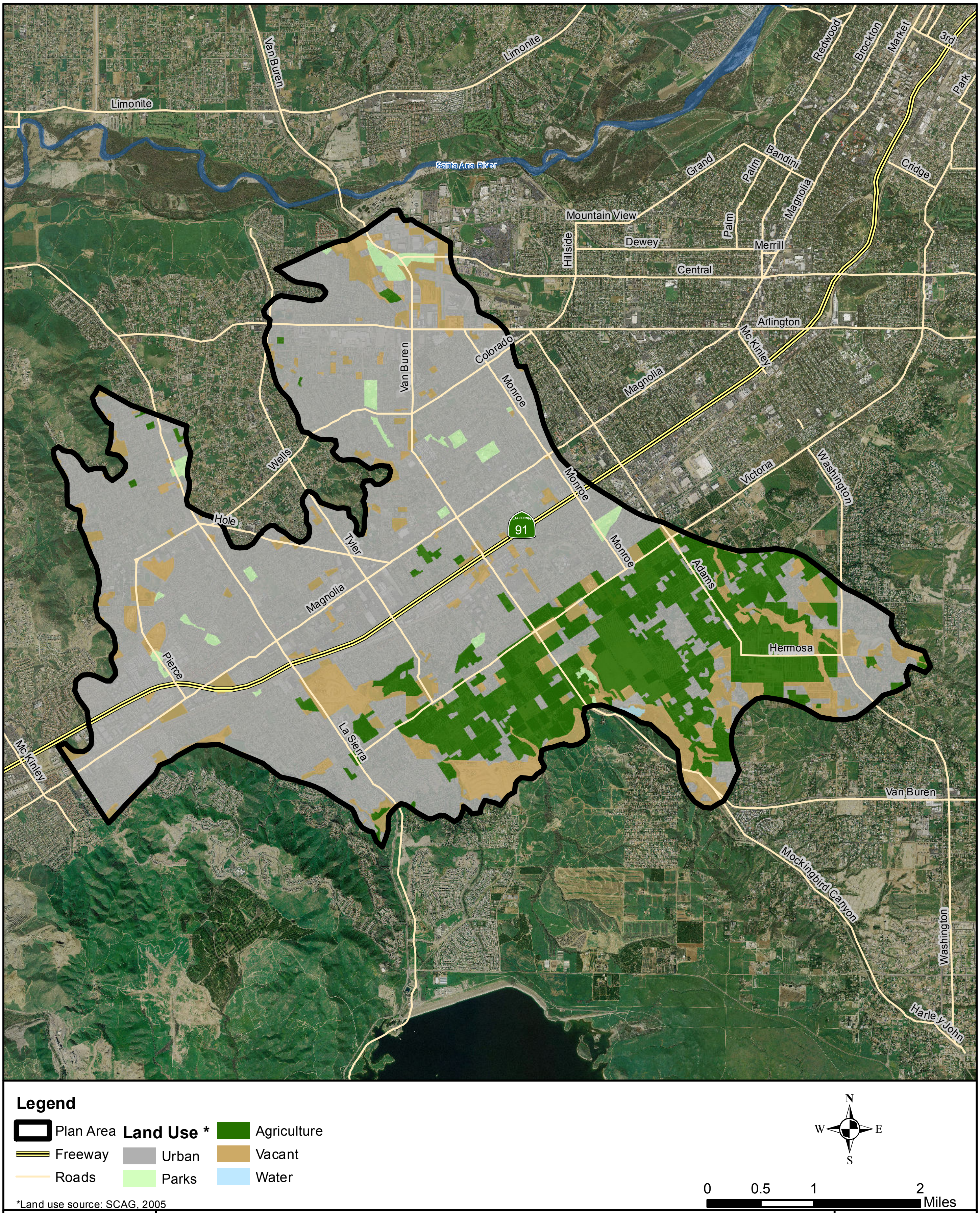


Figure 1.4a Land Use Summary, 2005

While Plan Area groundwater provides only a small portion of the water supplies for these uses, it is a local, reliable water source that is important for the future prosperity and sustainability of the region. Approximately 8,600 acre-feet (AF) of groundwater was produced from the Plan Area in 2009, with 19% coming from private wells for use within the basin and the remaining 81% coming from Western's Arlington Desalter wells (San Bernardino Valley Municipal Water District (Valley District) and Western, 2010). Figure 1.5 shows groundwater production by producer for 2009. Other water supply sources, including all supplies for municipal use, include groundwater from nearby groundwater basins, such as Rialto-Colton, Riverside, and Bunker Hill; imported water; and recycled water.



WESTERN MUNICIPAL WATER DISTRICT

Land Use, 2005

Arlington Basin Groundwater Management Plan

2010

Figure 1.4b

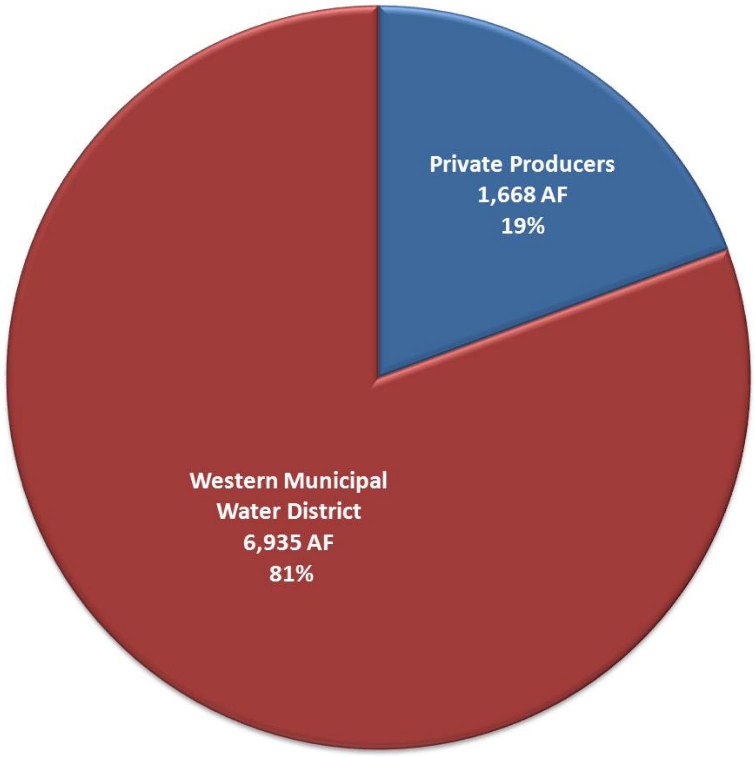


Figure 1.5 Groundwater Production by Agency, 2009

The Plan Area and the surrounding region are experiencing growth, and water demands are anticipated to increase as a result. While the majority of the Plan Area is developed for urban or agricultural use, projected growth will occur through infill throughout the basin. As competition for imported water supplies continues to become more intense and as drought, regulatory changes, and potential catastrophic failures threaten imported supplies, groundwater will continue to play a key role in creating a cost-effective and reliable water supply in the Plan Area through private production and operation of desalters for potable municipal use.

1.5 LEGISLATION RELATED TO GROUNDWATER MANAGEMENT PLANS

Groundwater is a resource shared by numerous users. It does not recognize or adhere to jurisdictional lines and cannot be tagged for use by certain users. Groundwater rights have evolved through case law since the late 1800s. Currently, there are three basic methods for managing groundwater resources in California:

- Local agency management under authority granted by the California Water Code or other applicable state statutes (such as a GWMP)
- Local government groundwater ordinances or joint powers agreements (JPA)

- Court adjudications

No law requires that any of these be applied within the Plan Area. As such, management is often instituted after local agencies or landowners recognize a specific groundwater problem. The level of groundwater management in any basin or subbasin is often dependent on water availability and demand.

In an effort to standardize groundwater management, the California Legislature passed Assembly Bill (AB) 255 (Stats. 1991, Ch. 903) in 1991. This legislation authorized local agencies overlying basins subject to critical overdraft conditions, as defined in DWR's Bulletin 118-80 (DWR, 1980), to establish programs for groundwater management within their service areas. Water Code § 10750 et seq. provided these agencies with the powers of a water replenishment district to raise revenue for facilities to manage the basin for the purposes of extraction, recharge, conveyance, and water quality management. Seven local agencies adopted plans under this authority (DWR, 2003).

The provisions of AB 255 were repealed in 1992 with the passage of AB 3030 (Stats. 1992, Ch. 947). This legislation greatly increased the number of local agencies authorized to develop a GWMP and set forth a common framework for management by local agencies throughout California. AB 3030, codified in Water Code § 10750 et seq., provides a local agency (those overlying the groundwater basins defined by DWR's Bulletin 118 (DWR, 1975) and updates (DWR, 1980, 2003)) a systematic procedure to develop a GWMP. Upon adoption of a plan, these agencies could possess the same authority as a water replenishment district to "fix and collect fees and assessments for groundwater management" (Water Code, § 10754). However, the authority to fix and collect these fees and assessments is contingent on receiving a majority of votes in favor of the proposal in a local election (Water Code, § 10754.3). More than 200 agencies (shown on Figure 1.6) have adopted an AB 3030 GWMP. None of these agencies is known to have exercised the authority of a water replenishment district.

Figure 1.6.
Areas with Groundwater Management Plans

Water Code section 10755.2 expands groundwater management opportunities by encouraging coordinated plans and by authorizing public agencies to enter into a JPA or memorandum of understanding (MOU) with public or private entities providing water service. At least 20 coordinated plans have been prepared to date involving nearly 120 agencies, including cities and private water companies.

In 2002, the California Legislature passed Senate Bill (SB) 1938 (Stats. 2002, ch. 603), which provides local agencies with incentives for improved groundwater management. While not providing a new vehicle for groundwater management, SB 1938 modified the Water Code by requiring that specific elements be included in a GWMP in order for an agency to be eligible for particular DWR funds for groundwater projects.

Through AB 3030 and SB 1938, local agencies can now develop GWMPs, such as this one, that guide the sustainable usage of the groundwater resource while also providing access to particular DWR funding sources.

1.6 PRIOR AND CURRENT WATER MANAGEMENT PLANNING EFFORTS

Several existing documents, including regulatory guidelines and planning recommendations, currently are used to manage groundwater in and around the Plan Area. This GWMP expands on these documents and in no way affects any previous court adjudications.

1.6.1 1969 WESTERN JUDGMENT

The Arlington Basin is not covered by the 1969 Western Judgment, but information is provided here due to its regional importance. The 1969 Western Judgment established the entitlements and groundwater replenishment obligations of the two major water agencies, Valley District and Western, relating to groundwater basins in their jurisdictions: the San Bernardino, Riverside, and Colton Groundwater Areas (these areas are defined by DWR as the Bunker Hill Groundwater Basin, Rialto-Colton Groundwater Basin, and the northern portion of the Riverside-Arlington Groundwater Basin). The Riverside Basin is split by the 1969 Western Judgment based on county boundaries into Riverside North (San Bernardino County) and Riverside South (Riverside County). The discussion in this subsection is based on the Western Integrated Regional Water Management Plan (IRWMP) (Western, 2008b).

The case was brought forth following concerns over the increasing groundwater withdrawals upgradient of the Bunker Hill Dike (San Jacinto Fault) for use within San Bernardino and Redlands as well as for export to Riverside County. It was initially linked to a broader case involving the Chino and San Bernardino Basins, as well as the diversions of surface water and pumping of underflow from the Santa Ana River and its tributaries.

The adjudication resulted in the naming of a Watermaster, consisting of two persons, one nominated by Valley District and the other by Western. The Watermaster prepares an annual report documenting the previous water year's pumping and export activities. In addition, groundwater elevation measurements, stream flow, and water quality measurements are documented.

The 1969 Western Judgment also requires the Watermaster to establish extraction rights and export rights based on the average annual extractions and exports that occurred over the 5-year period from 1959 through 1963.

The Watermaster uses the results of the documented information to make the following determinations as required by the 1969 Western Judgment.

1. Total actual average annual extractions from the San Bernardino Basin area by entities other than plaintiffs for use within San Bernardino County.
2. The natural safe yield of the San Bernardino Basin area based upon the cultural conditions equivalent to those existing during the 5-calendar-year period ending with 1963, determined initially by supplemental order of the Court to be 232,100 AF per annum, the amount is subject to the continuing jurisdiction of the Court.
3. The annual “adjusted right” of each exporter (plaintiff) to extract water from the San Bernardino Basin area based upon the percentage of the natural safe yield determined by the methods used in Table B-2 of the 1969 Western Judgment.
4. The annual production by plaintiffs for comparison with adjusted right determined in Item 3.
5. Annual discharge from the City of San Bernardino Water Quality Control Plant to the Santa Ana River as to quantity and quality, assumed for the purposes of the 1969 Western Judgment to be 16,000 AF annually and not subject to verification by the 1969 Western Judgment.
6. Average annual extractions from the Colton Basin area for use outside the San Bernardino Valley.
7. Average annual extractions from the Riverside Basin area within San Bernardino County for use outside the San Bernardino Valley.
8. The average static water levels within the Colton Basin and Riverside Basin within San Bernardino County as determined by the three wells listed in the 1969 Western Judgment (1S 4W 21 Q3, 1S 4W 29 H1, and 1S 4W 29 Q1); the elevation has been established at 822.04 feet above sea level, based on fall 1963 measurements.
9. The average annual extractions from that portion of the Riverside Basin area in Riverside County which is tributary to the Riverside Narrows for use in Riverside County.
10. Annual amounts of water extracted for use within Western from the San Bernardino Basin and the area downstream from there to the Riverside Narrows that have been exported for use outside the area tributary to the Riverside Narrows.
11. Annual amount of water extracted for use within San Bernardino County from the San Bernardino Basin area and Colton Basin area for use on lands that are not tributary to the Riverside Narrows.
12. Reduction in return flow now contributing to base flows at Riverside Narrows that results from conversion of agriculture using water within Western to domestic or other

uses connected to a sewage or waste disposal system, the effluent from which is not tributary to the rising water at Riverside Narrows; the average for 5 years ending in 1963 was established by the 1969 Western Judgment to be 3,916 acres and is not subject to verification.

1.6.2 SANTA ANA RIVER JUDGMENT

Orange County Water District (OCWD) filed a complaint on October 18, 1963, seeking an adjudication of water rights against substantially all water users in the area tributary to Prado Dam within the Santa Ana River Watershed, excluding the San Jacinto Watershed, which is tributary to Lake Elsinore. Thirteen cross-complaints were filed in 1968, extending the adjudication to include substantially all water users in the area downstream from Prado Dam. With some 4,000 parties involved in the case (2,500 from the Upper Area and 1,500 from the Lower Area), many believed that every effort should be made to arrive at a settlement and physical solution to avoid enormous and unwieldy litigation. The discussion in this subsection is based on the Western IRWMP (Western, 2008b).

The stipulated judgment (Santa Ana River Judgment) in *Orange County Water District vs. City of Chino et al.*, entered on April 17, 1969 (County of Orange Case No. 117628) became effective on October 1, 1970. It contains a declaration of rights of water users and other entities in the Lower Area of the Santa Ana River Basin downstream of Prado Dam as against those in the Upper Area tributary to Prado Dam, and it provides a physical solution to satisfy those rights.

The physical solution accomplishes, in general, a regional intrabasin allocation of the surface flow of the Santa Ana River System. The Santa Ana River Judgment leaves to each of the major hydrologic units within the basin the determination and regulation of individual rights therein and the development and implementation of its own water management plan subject only to compliance with the physical solution.

The Santa Ana River Judgment designates four public agencies to represent the interests of the Upper and Lower Areas and charges them with fulfilling the obligations set forth in the Santa Ana River Judgment, including implementation of the physical solution. The Lower Area is represented by OCWD. The Upper Area is represented by Valley District, Western, and Inland Empire Utilities Agency.

The court appoints a five-member Watermaster committee to administer the provisions of the Santa Ana River Judgment. The Watermaster's duty is to maintain a continuous accounting of each of the items listed in the letter of transmittal and to report annually for each water year to the court and the parties. The water year begins October 1 and ends the following September 30. The Santa Ana River Judgment specifies submission of the annual report 5 months after the end of the water year. The Watermaster requested that the time for submission be extended to 7 months after the end of the water year.

Each year, the Watermaster uses its long-established procedures to analyze the basic hydrologic and water quality data to determine (at Riverside Narrows and Prado Dam) base flow, base flow total dissolved solids (TDS), adjusted base flow, cumulative credits or debits to Upper Area parties, and the minimum required base flow for the following water year. The procedures include determining (for both locations) the amounts of nontributary flow or other flow to be excluded from base flow, the relative amounts of base flow and storm flow, and the relationships between electrical conductivity and TDS concentrations.

Watermaster determinations are made for Prado Dam as follows:

1. The components of flow at Prado Dam, which includes baseflow (42,000 acre-feet per year (AFY) minimum), storm flow, nontributary flow, and Arlington Desalter discharges, if any, to the river system
2. The adjusted base flow at Prado Dam credited to the Inland Empire Utilities Agency and Western.

Watermaster determinations are made for Riverside Narrows as follows:

1. The components of flow at Riverside Narrows, which includes base flow (15,250 AFY minimum), storm flow, and non-tributary flow
2. The adjusted base flow at Riverside Narrows credited to Valley District.

1.6.3 WATER QUALITY CONTROL PLAN FOR THE SANTA ANA BASIN

The Santa Ana Regional Water Quality Control Board (RWQCB) developed the *Water Quality Control Plan for the Santa Ana Basin* (Basin Plan) (2008) to protect and, where possible, enhance the quality of waters in the Santa Ana Basin, which includes the entirety of the Plan Area. The Basin Plan was developed specifically for the Santa Ana Basin and presents regional differences in existing water quality, the beneficial uses of the region's groundwater and surface water, and local water quality conditions and problems.

The Basin Plan for the Santa Ana Region includes statements of water quality goals and policies, descriptions of conditions, and discussions of solutions. It is also the basis for the RWQCB's regulatory programs. The Basin Plan establishes water quality standards for the region's groundwater and surface water. "Water quality standards," as used in the federal Clean Water Act, includes both the beneficial uses of specific water bodies and the levels of quality that must be met and maintained to protect those uses. The Basin Plan includes an implementation plan describing actions by the RWQCB and others necessary to achieve and maintain the water quality standards (RWQCB, 2008).

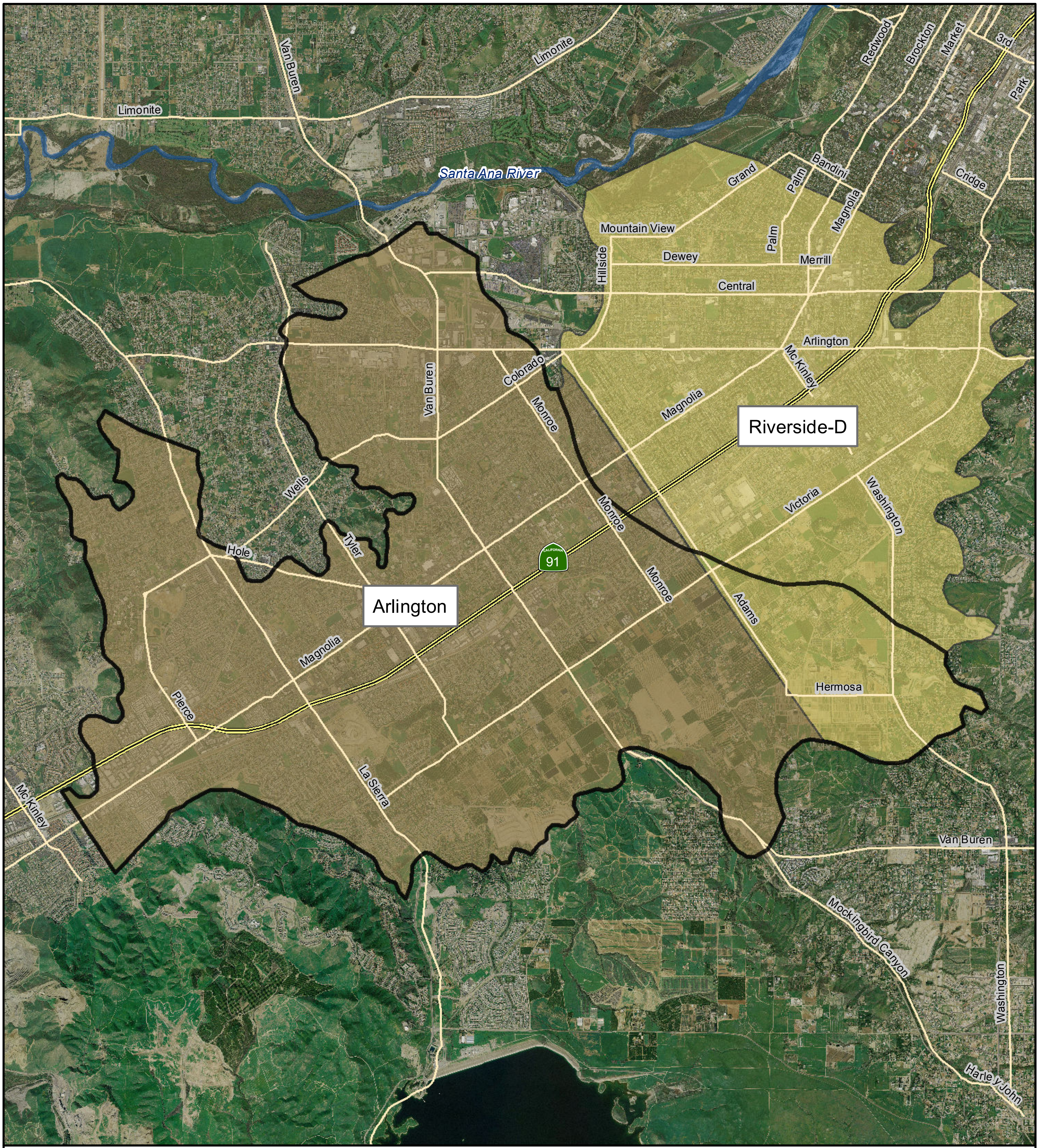
The plan was last updated in February 2008 to incorporate text from previous amendments and make other stylistic adjustments.

Notable from the viewpoint of groundwater management in the Plan Area are the Management Zone TDS and nitrate-nitrogen water quality objectives (amended by Resolution No. R8-2004-0001, January 22, 2004). The TDS and nitrate-nitrogen water quality objectives for each Management Zone are based on concentrations of TDS and nitrate-nitrogen from 1954 through 1973 and are referred to as the antidegradation objectives. One Management Zone, Arlington, covers the bulk of the Plan Area, with a smaller portion covered by Riverside-D, as shown on Figure 1.7. Additional information on TDS and nitrate-nitrogen concentrations in these Management Zones is provided in Section 2.3.6.

The RWQCB's principal means of achieving the water quality objectives and protecting the beneficial uses is development, adoption, issuance, and enforcement of waste discharge requirements. By regulating the quality of wastewaters discharged, and in other ways controlling the discharge of wastes that may impact surface and groundwater quality, the RWQCB works to protect the region's water resources. For TDS and nitrate-nitrogen, the objectives guide implementation of the regulations. The RWQCB's regulatory tools include National Pollutant Discharge Elimination System (NPDES) permits, waste discharge requirements, water reclamation requirements, water quality certification, and waste discharge prohibition. Permits for groundwater recharge involving recycled water are issued by the RWQCB, with recommendations from the California Department of Public Health (DPH).

1.6.4 WESTERN INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Western prepared an *Integrated Regional Water Management Plan* (IRWMP) (2008) to address long-range water supply planning to meet future demands in a rapidly growing area and to meet water supply reliability needs now and in the future. The IRWMP identifies and evaluates water management strategies that could increase local water supply, thereby improving water supply reliability. It also addresses local and regional water quality issues.



Legend

Plan Area

Freeway

Roads

* Management Zone Source: Wildermuth, 2005

N W E S

0 0.5 1 2 Miles

WESTERN MUNICIPAL WATER DISTRICT

Management Zones

Arlington Basin Groundwater Management Plan

2010

Figure 1.7

Western's member agencies and stakeholders identified approximately 90 loosely defined projects. These projects were refined, categorized, compared, and evaluated based on the following criteria:

- Project effectiveness
  - Providing new water supply
  - Improving water quality
  - Providing operational flexibility
  - Restoring ecosystems
- Support of water management strategies
  - Conservation
  - Conveyance and interties
  - Storage (through conjunctive use)
  - Groundwater management/ quality protection
  - Water supply
  - Recycled water production or delivery
  - Surface water management/ quality
  - Ecosystem protection/ restoration/ habitat enhancement/ wetlands restoration
  - Flood control
  - Land use planning
  - Recreation
- Project commitment
  - Readiness for implementation
  - Availability of local funds
- Other criteria
  - Serves disadvantaged communities
  - Provides regional benefits
  - Provides other benefits

The projects were grouped into three categories:

- Ready-Regional: Regional projects with adequate funding or planning progress to be implemented within the next 3 years
- Ready-Local: Local projects with adequate funding or planning progress to be implemented within the next 3 years
- Future Planning: Projects that need to acquire more funding to proceed, or are currently at a conceptual level

Of the Ready Projects, the following are of particular interest to the Plan Area:

- Ready-Regional
  - Riverside Pump Station #1 (Raub Regional Emergency Supply Project)
  - Riverside-Corona Feeder – Central Reach

    - Riverside-Corona Feeder – Southern Reach
    - Riverside/ Arlington Groundwater Basin Model
    - Western Water Use Efficiency Master Plan
- Ready-Local
    - Arlington Desalter expansion of 3.6 million gallons per day (mgd) (currently proposed project is up to 10.0 mgd)
    - System interconnections with the City of Riverside

1.6.5 SANTA ANA WATERSHED INTEGRATED REGIONAL WATER MANAGEMENT PLAN

In 2009, the Santa Ana Watershed Project Authority (SAWPA), in cooperation with numerous stakeholders, completed an IRWMP for the Santa Ana Watershed, which includes the Arlington Basin. This IRWMP, called "One Water One Watershed" or OWOW, was developed to solve problems on a regional scale and give all water interests a voice in the planning process. The OWOW identifies four key threats to water resources in the region:

- Climate change resulting in reduced water supplies combined with increased water needs in the region
- Colorado River reductions of imported supply due to upper basin entitlements and continued long-term drought
- Sacramento-San Joaquin Delta vulnerability resulting in reductions or loss of supply due to catastrophic levee failure or changing management practices of the Sacramento-San Joaquin Delta
- Population growth and development resulting in interruptions in hydrology and groundwater recharge while increasing water needs

The OWOW looked toward 2030 to develop a vision for the Santa Ana Watershed that is drought-proofed, salt-balanced, and supports economic and environmental viability. Through a collaborative planning process, major needs were identified, that, if addressed, could have a significant and immediate impact on the water supplies for the future. These needs are as follows:

- Increase storage
- Recycle water
- Desalinate groundwater
- Consider stormwater as a water supply
- Develop risk-based water quality improvements

A project evaluation process for the OWOW Plan was completed to identify multi-benefit, multi-jurisdictional projects that meet the needs of the region. These projects will then move forward to compete for funding under Proposition 84, Chapter 2, which contains more than $1 billion for regions across the state for new water supply and water quality improvement projects. However, it is anticipated that these bond funds only will meet a fraction of the Santa Ana Watershed's needs. Remaining funding will be needed through the development of new partnerships and creative, multi-benefit projects to prepare the watershed for a sustainable future (SAWPA, 2010). The OWOW Plan is being updated and identification of additional implementable system-wide integrated projects and programs will be a part of the next update to assist in meeting the watershed plan goals.

1.6.6 Metropolitan Water District of Southern California Integrated Water Resources Plan

Metropolitan Water District of Southern California (Metropolitan) developed an integrated resources plan (IRP) to establish regional targets for the development of water resources including conservation, local supplies, State Water Project (SWP) supplies, Colorado River Aqueduct supplies, and water drawn from regional storage and purchased through water transfers. These diverse supply sources are intended to provide regional supply reliability.

Metropolitan's IRP was developed in 1996 and updated in 2003 and again in 2010. The original IRP was developed as a two-phase process over a 2 ½-year period. Phase 1 included data collection, analysis, and decision-making. Major accomplishments during this phase were:

1. Defining resource management and business principles
2. Determining the reliability targets for the region
3. Projecting water demands
4. Identifying resource options

Phase 2 focused on developing a preferred resource mix and evaluating coordinated local water management efforts. Resource targets were developed for:

- Conservation
- Recycling, groundwater recovery, and seawater desalination
- SWP
- Colorado River Aqueduct
- In-region surface water storage
- In-region surface groundwater storage
- Central Valley/ SWP transfers and storage

The local project identified in the Plan Area is Western's Arlington Desalter Expansion. Metropolitan is supportive of the efficient management and use of local water resources such as the management envisioned in this plan (Metropolitan, 2004).

Metropolitan recently completed updating the plan; the update was approved on October 12, 2010. The 2010 IRP was developed to maintain traditional imported supplies from Northern California and the Colorado River while expanding local programs to meet future needs.

Projections in the 2010 IRP are through 2035, with conservation savings expected to be greater than any single source of supply (Metropolitan, 2010).

1.7 PUBLIC PROCESS IN DEVELOPING THE GROUNDWATER MANAGEMENT PLAN

The development of any GWMP is a collaborative process involving all interested stakeholders. Public input is critical to the success of the Arlington Basin GWMP and was a key component of its development.

The public was informed and encouraged to provide input and participate in the development of the GWMP in several forms:

- GWMP web site: **www.arlingtonplan.com** provided information to the public regarding the GWMP. Details about groundwater management in general and specific to the Plan Area were provided. Meeting dates, locations, and materials were posted along with details about the Advisory Committee and contact information.
- Newspaper advertisements in the *Riverside Press-Enterprise* gave notice of public hearings.
- Public hearings provided opportunities for personal communications that would be captured in the public record on specific topics, including resolutions of intent to draft a GWMP and resolution of adoption of the GWMP.
- Public meetings provided details on the GWMP process and solicited input.
- Advisory Committee meetings provided detailed technical information on the GWMP and solicited input.
- Direct communication by telephone, email, and mail was encouraged at meetings and on the web site. Comments could be sent to the Western project manager or the consultant project manager.

Key meetings, hearings, and other activities are summarized in the following sections.

1.7.1 NOVEMBER 5, 2008

A stakeholder meeting was held at 6 p.m. November 5, 2008 on the campus of California Baptist University in Riverside. The meeting was coordinated to include stakeholders in both the Plan Area and the Riverside Basin, which was concurrently undergoing the process of development of a GWMP. Letters were sent to stakeholders based on well ownership records of the Western-San Bernardino Watermaster and lists of local agencies. The letters provided information on the plan and invited participation in plan development. Letters were provided to:

- Agua Mansa Properties
- Roger Aguinaga Co., Inc.
- Alamo Water Company

- Box Springs Mutual Water Company
- Cal Baptist University
- California Portland Cement Company
- City of Colton
- City of Corona
- Corridor Land Company (Owl Resources)
- El Rivino Country Club
- Elsinore Valley Municipal Water District
- Gage Canal Company
- General American Transportation Company
- City of Grand Terrace
- Green Acres
- Green Acres Memorial Park Association
- Holliday Trucking
- Home Gardens
- Indian Hills Country Club
- Jurupa Community Services District
- La Sierra University
- Loring Ranch 31503 LP
- Loving Homes Greens Homeowners
- Meeks & Daley Water Company
- Merryfield Water Company
- Montecito Memorial Park
- City of Norco
- Rapid Infiltration and Extraction Facility
- Reche Canyon Mutual Water Company
- City of Riverside Parks and Recreation
- Riverside Canal Power Co.
- Riverside Cement Company
- Riverside County Flood Control & Water Conservation District
- Riverside County Parks Department
- Riverside Highland Water Company
- Riverside Public Utilities
- Rubidoux Community Services District
- RWQCB
- SAWPA
- Tri-County Linen Supply
- Universal Forest Products
- University of California, Riverside
- USGS
- Victoria Country Club
- West Riverside 350 Water Company
- West Valley Water District
- Western-San Bernardino Watermaster
- Yeager, Reidman & Horn

The meeting was open to the public and well attended. Organizations represented at the meeting, according to the sign-in sheet, included:

- Agua Mansa Properties
- Alamo Water Company
- California Portland Cement Company
- California Baptist University
- City of Corona
- Elsinore Valley Municipal Water District
- GFB & Associates
- Gage Canal Company
- Jurupa Community Services District
- Riverside County Parks Department
- Riverside County Flood Control and Water Conservation District
- Riverside Public Utilities
- Rubidoux Community Services District
- City of San Bernardino Municipal Water Department
- Tri-City Linen
- Victoria Club
- Western Municipal Water District
- Western-San Bernardino Watermaster

A presentation was given describing GWMPs, including the components, benefits, and the procedures. The Advisory Committee was introduced and interested parties were invited to join the committee. The importance of stakeholder participation was stressed and the various options for participation were described. The concepts of basin goals and BMOs were discussed with potential options for the basin. Stakeholder input was solicited on all items and a question-and-answer period allowed for response to stakeholder questions and concerns.

1.7.2 November 19, 2008

A public hearing was held at 9:30 a.m. on November 19, 2008 at Western's offices in Riverside. The public was notified through two advertisements in the *Riverside Press-Enterprise* on November 5, 2008 and November 12, 2008. The advertisement was a written statement provided to the public describing the manner in which interested parties may participate in developing this GWMP. At the hearing, the Western Board of Directors conducted the initial public hearing regarding Western's intent to draft a GWMP for the Plan Area in accordance with the requirements of Water Code Section 10750 et. seq. and to receive public comment regarding the intention to draft the GWMP. Discussion at the hearing included a presentation to the board and the public by General Manager John Rossi describing the GWMP, including the components, benefits, procedures, and opportunities for public input. Public comments were solicited, but none were given at the hearing. The Board adopted the resolution of intention to draft the GWMP as Resolution Number 2570. The resolution was advertised in the *Riverside Press-Enterprise* on January 22, 2009 and January 29, 2009. The advertisements and minutes are included in Appendix A.

1.7.3 MARCH 18, 2009

An Advisory Committee meeting was held on March 18, 2009 at the offices of RPU to discuss:

- Why the GWMP is being developed
- How the GWMP would affect other agencies or other stakeholders
- What are the goals and objectives of the GWMP
- What are the next steps in developing the GWMP

A presentation was given followed by a question-and-answer period. The meeting, which also included discussions of the Riverside Basin GWMP, was attended by representatives of:

- City of Colton
- City of San Bernardino Municipal Water Department
- Jurupa Community Services District
- Riverside Public Utilities
- Western

1.7.4 AUGUST 3, 2010

Stakeholders and Advisory Committee members were provided a copy of the draft Sections 1-4 to develop a common understanding of the basin conditions prior to developing the remainder of the document. The draft Sections 1-4 were provided to the following on August 3, 2010:

- California Baptist University
- City of Corona
- Gage Canal Company
- Home Gardens County Water District
- La Sierra University
- Lordan Management
- Loving Homes Greens Homeowners
- City of Norco
- Riverside County Flood Control & Water Conservation District
- City of Riverside Parks and Recreation
- RPU
- RWQCB
- SAWPA
- Sherman Indian High School
- USGS
- Valley District
- Watermaster Support Services

Comments were received and incorporated into the draft document.

1.7.5 OCTOBER 12, 2010

Stakeholders and Advisory Committee members were provided a copy of the draft GWMP for review and comment on October 12, 2010. Copies provided to the following:

- California Baptist University
- City of Corona
- Gage Canal Company

- Home Gardens County Water District
- La Sierra University
- Lordan Management
- Loving Homes Greens Homeowners
- City of Norco
- Riverside County Flood Control & Water Conservation District
- City of Riverside Parks and Recreation
- RPU
- RWQCB
- SAWPA
- Sherman Indian High School
- USGS
- Valley District
- Watermaster Support Services

Comments were received and were incorporated into the GWMP

1.7.6 NOVEMBER 3, 2010

A public hearing was held at 9:30 a.m. on November 3, 2010 at Western's offices in Riverside to renotify the public of the development of the GWMP. The public was notified through two advertisements in the *Riverside Press-Enterprise* on October 21, 2008 and October 28, 2010. The advertisement was a written statement provided to the public describing the manner in which interested parties may participate in developing this GWMP. At the hearing, the Western Board of Directors conducted a public hearing regarding Western's intent to draft a GWMP for the Plan Area in accordance with the requirements of Water Code Section 10750 et. seq. and to receive public comment regarding the intention to draft the GWMP. The components, benefits, procedures, and opportunities for public input in the GWMP were discussed. Public comments were solicited, but none were given at the hearing. The Board adopted the resolution of intention to draft the GWMP as Resolution Number 2694. The resolution was advertised in the *Riverside Press-Enterprise* on February 8, 2011 and February 15, 2011. The advertisements and minutes are included in Appendix A.

1.7.7 OCTOBER 26, 2011

A stakeholder meeting was held at 6 p.m. October 26, 2011 on the campus of California Baptist University in Riverside. The public was invited to attend the meeting, including letters to previously identified stakeholders:

- California Baptist University
- City of Corona
- Gage Canal Company
- Home Gardens County Water District
- La Sierra University
- Lordan Management
- Loving Homes Greens Homeowners

- City of Norco
- Riverside County Flood Control & Water Conservation District
- City of Riverside Parks and Recreation
- RPU
- RWQCB
- SAWPA
- Sherman Indian High School
- USGS
- Valley District
- Watermaster Support Services

The draft GWMP was summarized in a presentation. The presentation included the water resource conditions in the basin, water requirements and supplies, goals, objectives, elements, and implementation. The stakeholders were provided an additional opportunity to provide comments on the GWMP or to request additional time to provide comments. No additional comments or requests for additional time for review were received.

The meeting was attended by representatives of:

- California Baptist University
- Riverside County Flood Control and Water Conservation District
- Riverside Public Utilities
- Riverwalk
- Valley District
- Watermaster Support Services
- Western

1.7.8 DECEMBER 21, 2011

A public hearing was held at 9:30am on December 21, 2011 at Western's offices at 14205 Meridian Parkway in Riverside. The public was notified through two advertisements in the *Riverside Press-Enterprise* on December 7, 2011 and December 14, 2011. At the hearing, the Western Board of Directors conducted a public hearing regarding Western's adoption of this GWMP for the Plan Area in accordance with the requirements of Water Code Section 10750 et. seq. and to receive public comment regarding the intention to adopt the GWMP. Discussion at the hearing included a presentation to the Board of Directors and the public which included a summary of the plan, including the components, benefits, and implementation. The presentation included information for the public that copies of the plan may be obtained for the cost of reproduction at Western's offices in Riverside. The Board of Directors adopted a resolution to adopt the GWMP. The advertisements and the resolution are included in Appendix A.

1.8 ADVISORY COMMITTEE

The Arlington Basin GWMP Advisory Committee was organized to solicit input and direct the development of the GWMP. Agencies were invited to send representatives to participate in the Advisory Committee. Other stakeholders were invited to join through the public notification process, including hearings, letters, the web site, and public meetings. Mr. Tom Field of RPU and Mr. Fakhri Manghi of Western attended the Advisory Committee meetings. Other agencies were invited to attend. Meetings and regular conference calls were held from late 2008 through early 2011 to coordinate stakeholder input and incrementally build the GWMP. Advisory Committee members also received draft text during the development of the GWMP and their comments were incorporated into the document.

1.9 ARLINGTON BASIN GWMP AND CONSISTENCY WITH CALIFORNIA WATER CODE

Groundwater management is the planned and coordinated local effort of sustaining the groundwater basin in order to meet future water supply needs. With the passage of AB 3030 in 1992, local water agencies were provided a systematic way of formulating GWMPs (California Water Code, § 10750 et. seq.). Senate Bill 1938, passed in 2002, further emphasizes the need for groundwater management in California. It requires AB 3030 GWMPs to contain specific plan components to be eligible to receive state funding for water projects. The Arlington Basin GWMP includes the seven components that are required to be eligible for DWR funds for the construction of groundwater projects or groundwater quality projects. The GWMP also addresses the 12 specific technical issues identified in the Water Code along with the seven recommended components identified in DWR Bulletin 118-03 (DWR, 2003). Table 1.1 lists the required and recommended components and identifies the specific section of this GWMP in which the components are discussed.

Table 1.1 Arlington Basin Groundwater Management Plan Components

Component	GWMP Section(s)
SB1938 Mandatory	
1. Documentation of public involvement	1.7
2. BMOs	5.3
3. Monitoring and management of groundwater elevations, groundwater quality, inelastic land subsidence, and changes in surface water flows and quality that directly affect groundwater levels or quality	6.3
4. Plan to involve other agencies located in the groundwater basin	6.4
5. Adoption of monitoring protocols	6.3, App. E
6. Map of groundwater basin boundary, as delineated by DWR Bulletin 118, with agencies' boundaries that are subject to GWMP	Figures 1.1, 1.2, and 1.3
7. For agencies not overlying groundwater basins, GWMP prepared using appropriate geologic and hydrogeologic principles	n/ a
AB 3030 and SB 1938 Voluntary	
1. Control of saline water intrusion	6.2.1
2. Identification and management of well protection and recharge areas	6.2.2
3. Regulation of the migration of contaminated groundwater	6.2.3
4. Administration of well abandonment and destruction program	6.2.4
5. Control and mitigation of groundwater overdraft	1.1.1
6. Replenishment of groundwater	6.1.2
7. Monitoring of groundwater levels	6.3.1
8. Development and operation of conjunctive use projects	6.1.3
9. Identification of well construction policies	6.2.5
10. Construction and operation of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects	6.2.6
11. Development of relationships with state and federal regulatory agencies	6.4.2
12. Review of land use plans and coordination with land use planning agencies to assess activities that create reasonable risk of groundwater contamination	6.4.4
DWR Bulletin 118 Recommended	
1. Management with guidance of Advisory Committee	1.7, 1.8, 6.4.1
2. Description of area to be managed under GWMP	1.2
3. Links between BMOs and goals and actions of GWMP	5
4. Description of GWMP monitoring programs	6.3, App. E
5. Description of integrated water management planning efforts	1.6, 6.4.3
6. Report of implementation of GWMP	6.4.5
7. Periodic evaluation of GWMP	6.4.5

2.1 CLIMATE

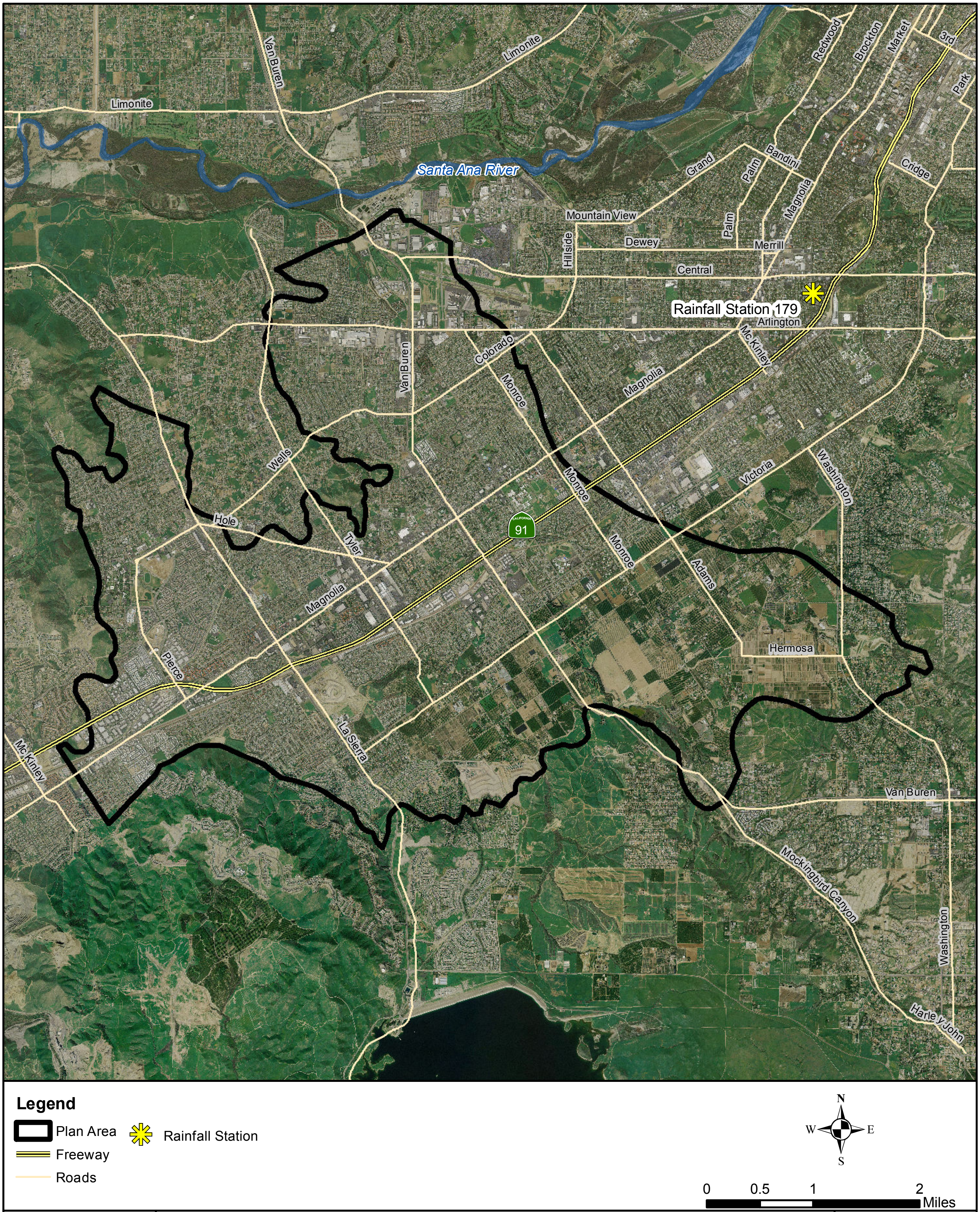
The Plan Area is located in a semi-arid area region characterized by dry, hot summers and precipitation concentrated during mild winters. This climate results in significantly higher water demand in the summer than in the winter. Average monthly temperature and reference evapotranspiration data are shown in Table 2.1.

Table 2.1 Average Monthly Temperature and Reference Evapotranspiration

Parameter	Month												Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Average Maximum Temperature (°F)*	66.4	67.9	70.2	75.0	79.5	86.6	93.9	94.4	90.6	82.5	73.5	67.5	79.0
Average Minimum Temperature (°F)*	41.6	43.3	45.0	47.9	52.6	56.3	60.7	61.3	58.4	52.5	45.5	41.3	50.5
Average Reference Evapotranspiration (inches [in])**	2.49	2.91	4.16	5.27	5.94	6.56	7.22	6.92	5.35	4.05	2.94	2.56	56.37

* Source: Western Regional Climate Center, 2009. Riverside Citrus Experiment Station. Period of record July 1948 – December 2008. http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca7473
** Source: California Irrigation Management System. 2009. 44 UCR Riverside. Period of record June 1985 – February 2009. http://www.cimis.water.ca.gov/cimis/monthlyEToReport.do; June 1985 – February 2009

The Riverside County Flood Control and Water Conservation District (RCFCWCD) collects precipitation data at Station 179 and several other stations. Station 179 is located at the City of Riverside Fire Station #3 on Riverside Avenue, just north of the Plan Area near the intersection of Highway 91 and Central Avenue (Figure 2.1). Data from Station 179 are considered reliable and high-quality with a long period of record. Station 179 precipitation data provided by RCFCWCD includes daily data from 1881 to 2009. The annual average precipitation and the cumulative departure from annual average at Station 179 are shown on Figure 2.2. The cumulative departure from annual average shows the accumulation, since 1880, of the differences (departures) in annual total precipitation from the average value for each year for the period of record; a rising line represents wetter-than-normal conditions while a falling line represents drier-than-normal conditions. The long-term average annual precipitation for the period from 1881 to 2009 is 10.5 inches.



WESTERN MUNICIPAL WATER DISTRICT

Rainfall Station 179

Arlington Basin Groundwater Management Plan

2010

Figure 2.1

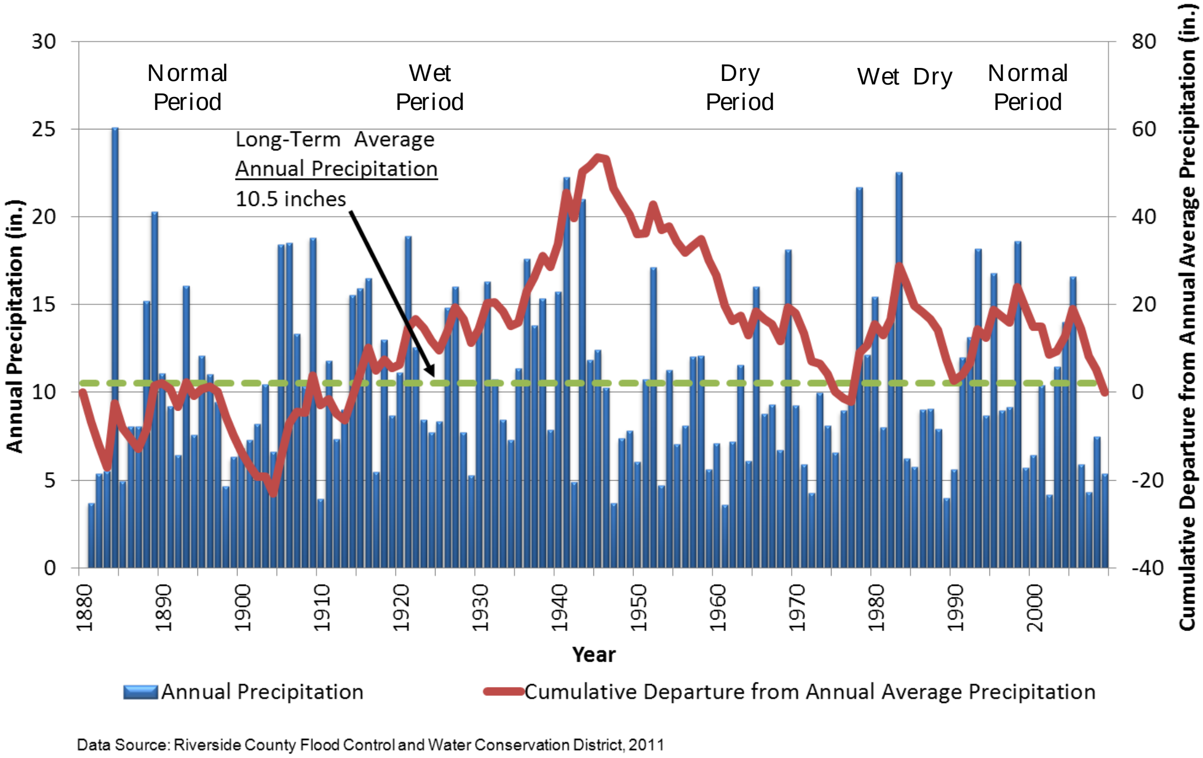


Figure 2.2 Historical Annual Precipitation and Cumulative Departure from Annual Average Precipitation

The cumulative departure from annual average precipitation chart shows an extended wet period from 1905 through the mid-1940s, followed by an extended dry period through the mid-1970s. Wet and dry periods have an impact on water supplies and water demands. In dry periods, groundwater quantities in the Arlington Basin and surrounding basins is impacted by reduced recharge from reduced precipitation and the associated reduced surface water flows. Wet periods have the opposite effect, increasing recharge to the basin. Demand is also impacted by precipitation, with increased demands due to evapotranspiration during dry periods occurring simultaneously with increased voluntary and mandatory conservation efforts.

Figure 2.3 shows the long-term average monthly precipitation at Station 179. Most precipitation occurs during the mild winters, from November through April.

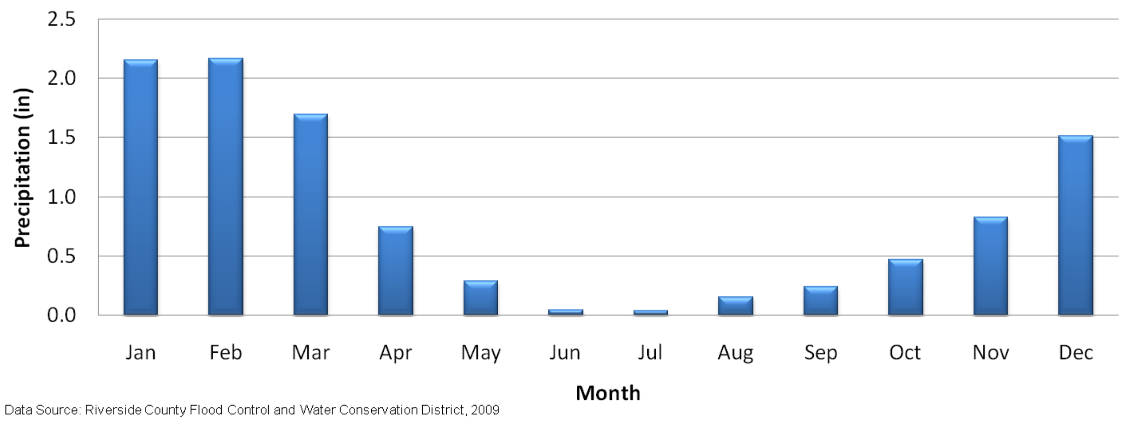


Figure 2.3 Average Monthly Precipitation

2.2 SURFACE WATER

There are no major surface water bodies in the Plan Area. Smaller surface water bodies include several flood control basins and the partially lined Arlington, La Sierra, and Arizona flood control channels operated by RCFCWCD.

2.3 GROUNDWATER

Groundwater is produced from the alluvial sediments in the Plan Area. Recharge to the basin occurs from precipitation, applied water, and recharge from the surrounding watersheds. Water quality is poor, particularly with respect to ambient water quality related to TDS (on average greater than 950 milligrams per liter [mg/ L]) and nitrate (on average greater than 20 mg/ L, as nitrogen). Total dissolved solids and nitrate concentrations have shown little long-term variability since at least the 1950s (Wildermuth Environmental, Inc. [Wildermuth], 2008b). Additional details are provided in the following sections.

2.3.1 GEOLOGIC SETTING

The Plan Area is located within the Perris Block of the northern Peninsular Ranges. The Peninsular Ranges are northwest oriented mountain ranges and faults extending from the Los Angeles Basin to the tip of Baja California. The Arlington Basin is an alluvium filled feature between such mountain ranges. (DWR, 2003; Harden, 1998; Woodford et al, 1971). The boundaries shown on Figure 1.1, are delineated by the impermeable rocks of Box Springs Mountains to the east, Arlington Mountain to the south, Arlington Narrows to the southwest, the La Sierra Heights to the northwest (DWR, 2003), and a surface water flow divide to the north.

2.3.2 WATER-BEARING FORMATIONS

Groundwater in the Plan Area is generally unconfined and found in alluvial deposits of depths up to 250 feet in the center of the basin. The deposits are continuous with the Riverside Basin deposits to the northeast and the Temescal Basin deposits to the southwest. The Quaternary Period alluvial deposits consist of gravel, sand, silt, and clay. These materials were deposited by the ancestral Santa Ana River and other surface channels in a bedrock canyon formed by ancient drainage systems running from south to north, emptying into the main portion of the Santa Ana Basin near Colton (Eckis, 1934).

For specific details on the water-bearing formations, a three-dimensional hydrostratigraphic model (3-D model) of the Plan Area and surrounding area was created by Numeric Solutions, LLC (2010), for use in developing a single groundwater model, RAGFM, for the Riverside and Arlington Basins. This model is discussed in further detail in Section 1.3 and in WRIME (2011a). The 3-D model was based on available drillers' logs, which were coded with depth based on lithology. Interpolation was performed by kriging to develop the 3-D model from ground surface to bedrock. Detailed cross-sections of the alluvial basin from the 3-D model are included in Appendix B.

2.3.3 SOILS

Surface soils impact the amount of water that infiltrates to groundwater as opposed to contributing to surface runoff. A relevant soil classification used by the United States Department of Agriculture Natural Resources Conservation Service for hydrology is the hydrologic soil group. The hydrologic soil group can be used to estimate the amount of infiltration that can be expected from specific soil types. This can be useful for determining areas of natural recharge or areas suitable for artificial recharge facilities. The grouping was developed from water intake estimates during the latter part of a storm of long duration, after the soil profile is wet and has an opportunity to swell, without the protective effect of any vegetation. Also considered are depths to the seasonal high water table and to a low permeability layer. The classification is useful at a planning level, but detailed studies are required for a thorough understanding of the infiltration capacity of soils. Features such as slope, ground cover, or low permeability subsurface materials away from the upper soil profile may impact the soil's capability to infiltrate water. Under the hydrologic soil group classification system, soils are grouped A to D with A having the lowest runoff potential (highest infiltration rates) and D having the highest runoff potential (lowest infiltration rates), as summarized in Table 2.2.

Table 2.2 – Characteristics of Hydrologic Soil Groups

Soil Group	Characteristics
Group A	Sand, loamy sand, or sandy loam, low runoff potential and high infiltration rate. Primarily deep, well drained soils with high sand or gravel content.
Group B	Silt loam or loam, moderate infiltration rate when thoroughly wetted. Mostly deep to moderately deep, well drained soils with moderate to low sand content.
Group C	Sandy clay loam, low infiltration rates when thoroughly wetted. Fine to moderately fine texture, often with layers that block downward movement of water.
Group D	Clay loam, silty clay loam, sandy clay, silty clay, or clay. Very fine texture with high runoff potential and low infiltration rates. Often very shallow, over bedrock or high water table.

A map of hydrologic soils groups is provided on Figure 2.4 (Knecht, 1971). In the Plan Area, there are few high permeability A soils. B soils are found through a large portion of the basin, generally along the southwest-northeast basin axis. Soils southeast of Highway 91 are a mix of B and C soils while D soils are in the northwestern portion of the basin, in the vicinity of Van Buren Boulevard and Arlington Avenue. Hydrologic soils group information may be used as one criteria for identification of areas suitable for artificial recharge of groundwater, protection of existing natural recharge areas, or identification of areas vulnerable to ground water contamination.

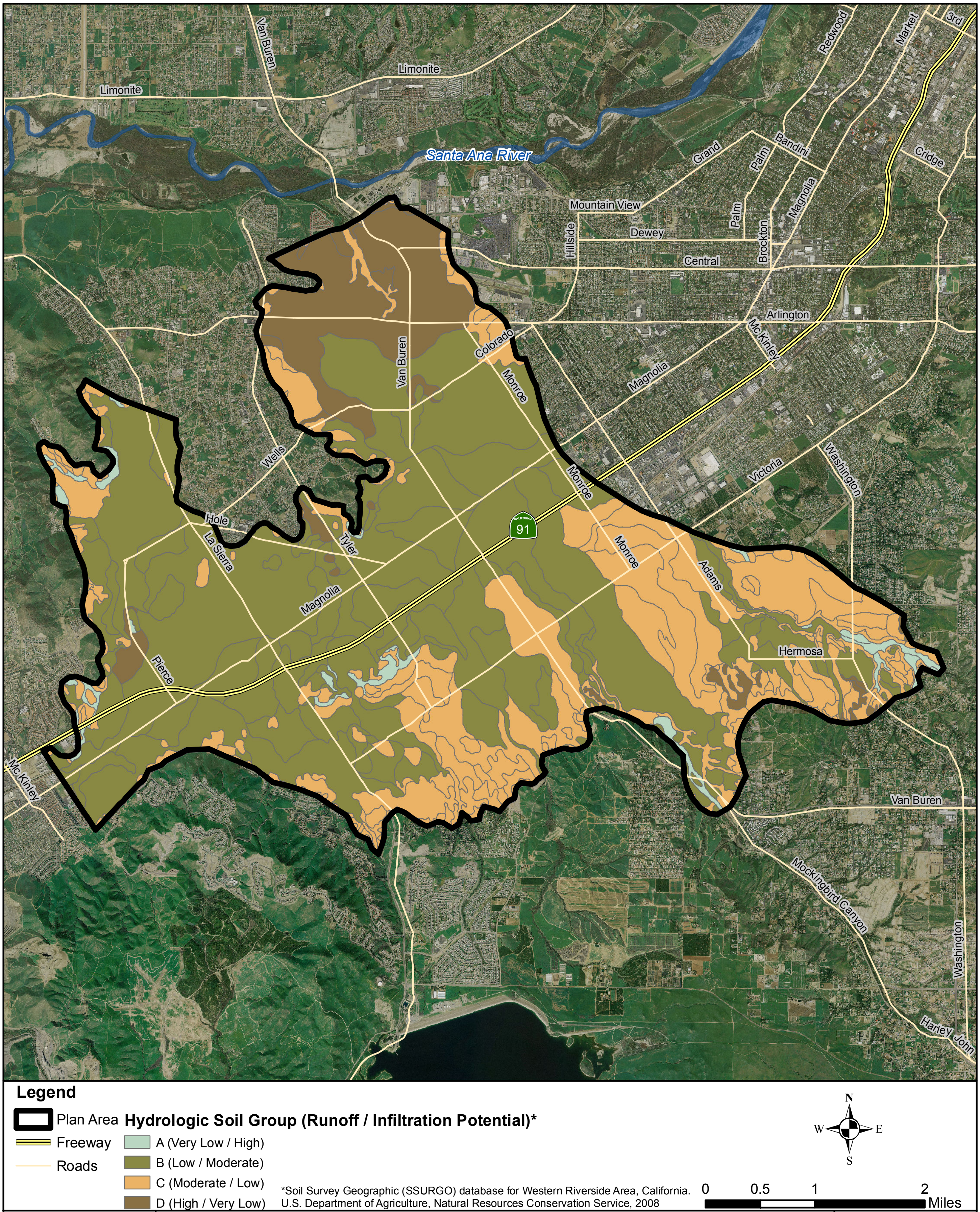
2.3.4 HISTORICAL DEVELOPMENT PATTERNS

Significant early groundwater development in the Arlington area coincides with the beginnings of the citrus industry. In the 1880s, citrus growers in the Arlington area began growing a new variety of orange from Bahia, Brazil. The rapid dominance of this variety, known as the Washington Naval Orange, in the 1890s resulted in great wealth for the Arlington area, and increased the demand for irrigation water to provide consistent, high-quality water to the trees (Lawton and Weathers, 1989).

Land use changed in the post-World War II era as urbanization replaced much of the citrus groves with residential, commercial, and industrial development. The shift from agricultural to urban uses resulted in different water demand patterns, water return flows to the aquifer, and water quality needs. Further discussion of more recent water supplies can be found in Section 3, Water Requirements and Supplies.

2.3.5 GROUNDWATER LEVELS

As discussed previously, land use patterns and water demands in the Plan Area have changed over the years as the once dominant agriculture gave way to increasing urbanization. In spite of these changes, flow patterns today remain similar to those in the 1930s. Figure 2.5 shows recent groundwater levels from fall 2009. Figure 2.6 compares water levels in January 1933 (Eckis, 1934) to fall 2009 (Western and Watermaster Support Services, 2010), showing that the recent water levels are generally within 0 to -40 feet of the water levels approximately 80 years ago with similar flow patterns toward Arlington Narrows. The historical precipitation data on Figure 2.2 shows that January 1933 was toward the end of a long wet period. The 1933 time period also followed the introduction of imported water for irrigation of the citrus trees. The imported water resulted in a rise in groundwater levels and a shift in flow direction. Prior to development and associated irrigation, groundwater flow was likely toward the Riverside Basin, while in the 1930s (Eckis, 1934) and today groundwater flow is toward the southwest through the Arlington Gap. Hydrographs of water levels at 3 selected wells, shown on Figures 2.7 and 2.8, demonstrate water level changes over time through different hydrologic conditions. Generally, these hydrographs show increasing water levels starting around 1960 and stabilizing or declining somewhat after the 1980s.



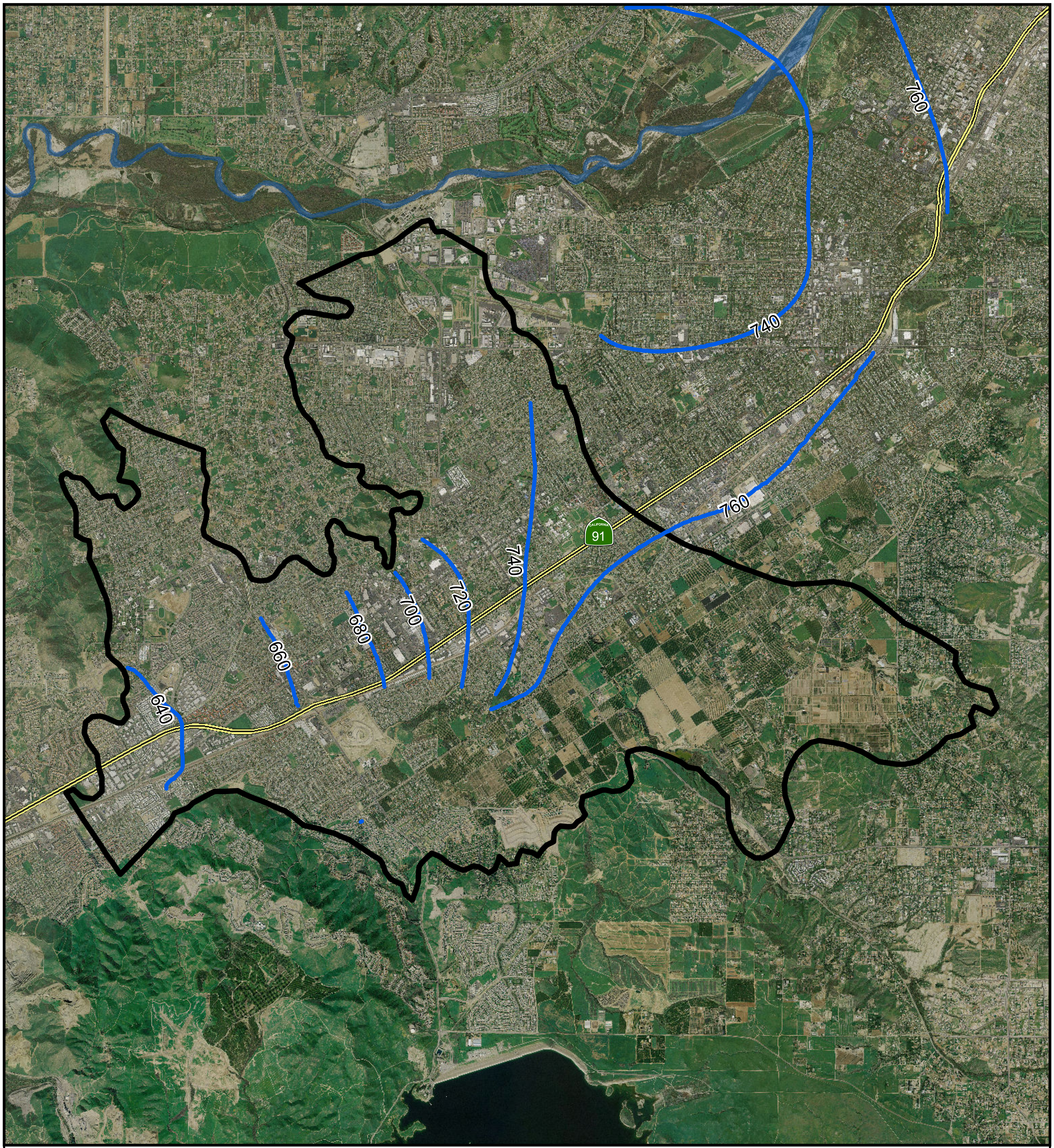
WESTERN MUNICIPAL WATER DISTRICT

Hydrologic Soil Groups

Arlington Basin Groundwater Management Plan

2010

Figure 2.4



Legend

- Plan Area
- Santa Ana River
- Freeway
- Fall 2009 Water Levels (ft MSL)*

*Fall 2009 Groundwater Elevation from Watermaster database, 2010.

N S E W

0 0.5 1 2 Miles

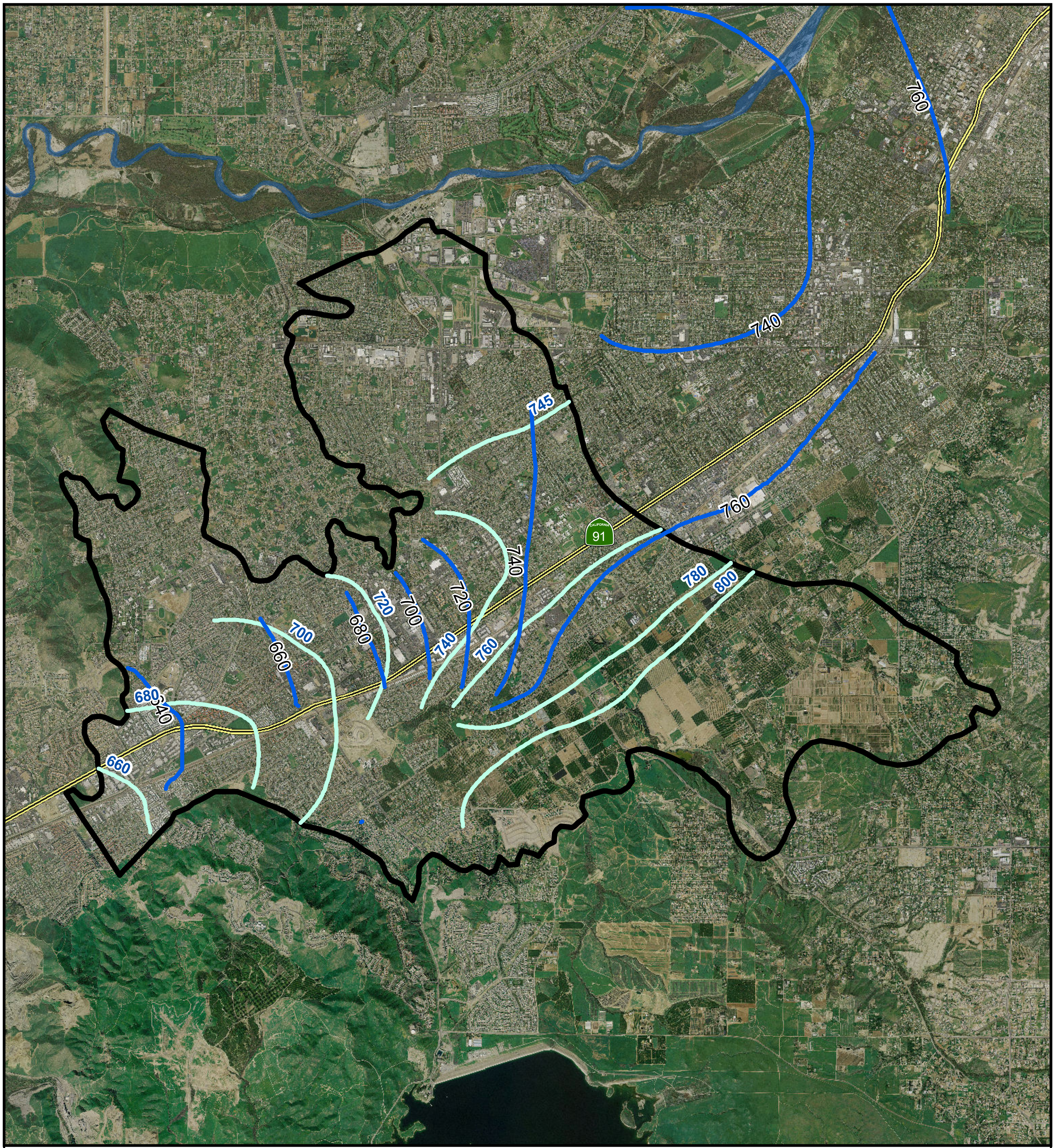
WESTERN MUNICIPAL WATER DISTRICT

Fall 2009 Groundwater Levels

Arlington Basin Groundwater Management Plan

2010

Figure 2.5



Legend

- Plan Area
- Santa Ana River
- Freeway
- Fall 2009 Water Levels (ft MSL)*
- January 1933 Water Levels (ft MSL)

*Fall 2009 Groundwater Elevation based on Watermaster database, 2010
Jaunary 1933 Groundwater Elevation from Eckis, 1934

N
W E
S

0 0.5 1 2 Miles

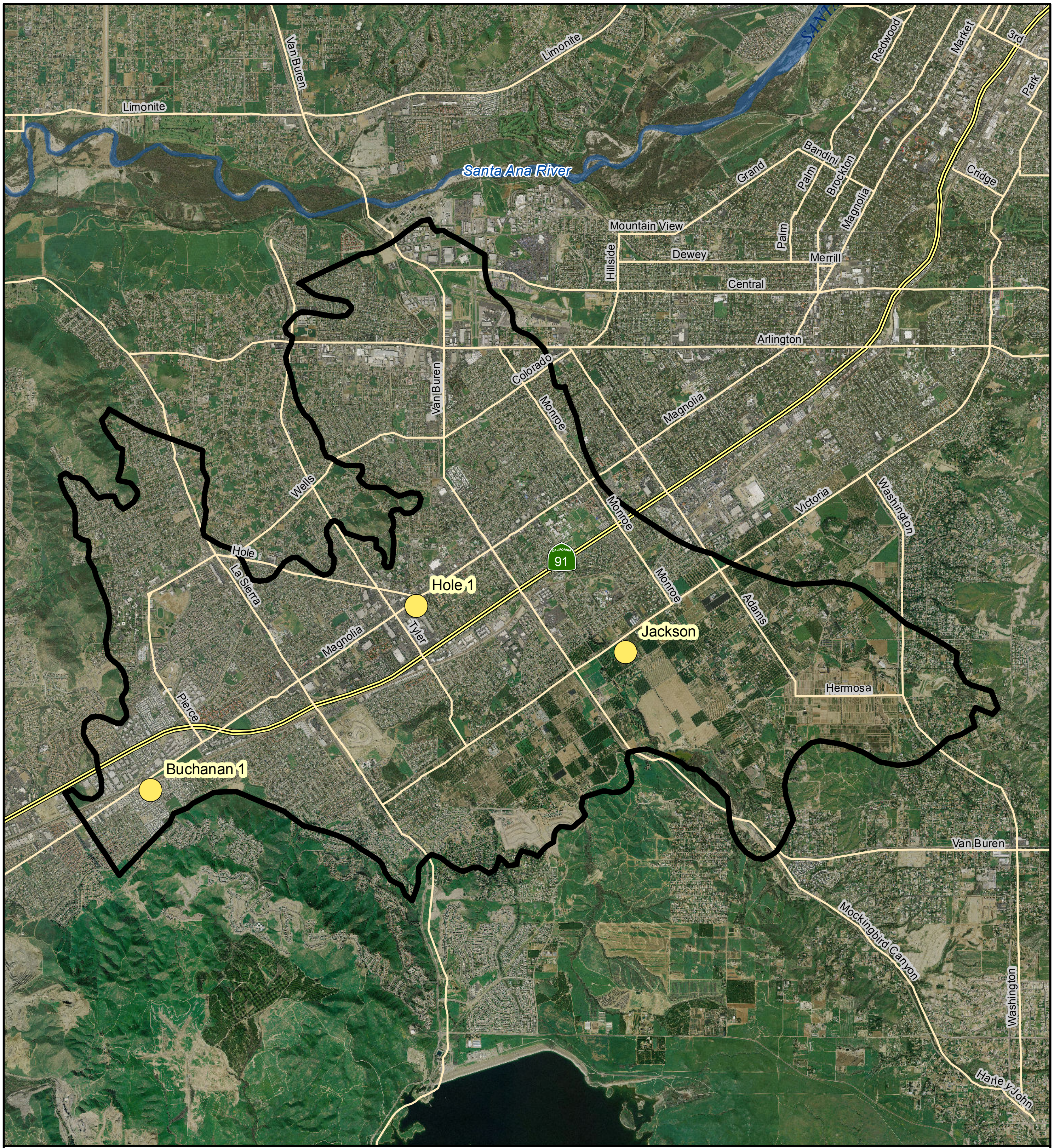
WESTERN MUNICIPAL WATER DISTRICT

Comparison of Recent and Historical Groundwater Elevations

Arlington Basin Groundwater Management Plan

2010

Figure 2.6



Legend

Plan Area

Freeway

Roads

Wells with Hydrographs in Figure 2.8

N W E S

0 0.5 1 2 Miles

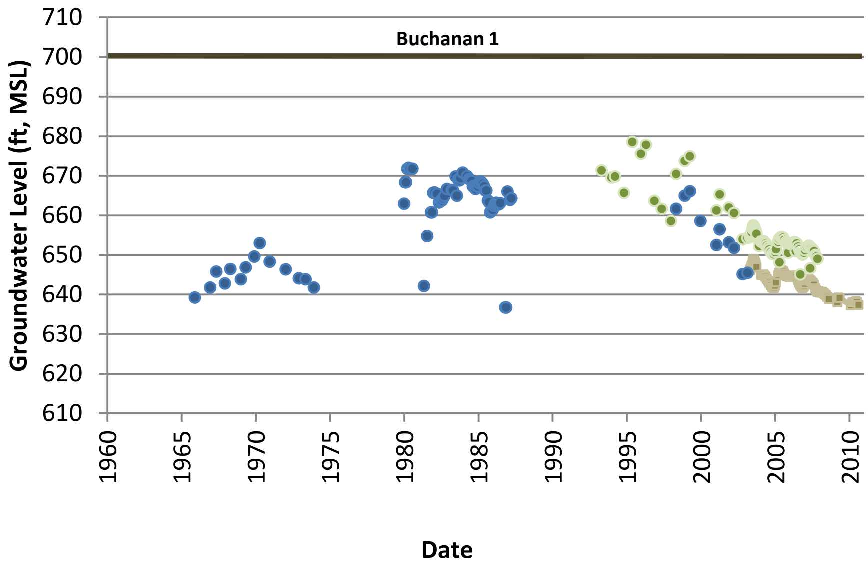
WESTERN MUNICIPAL WATER DISTRICT

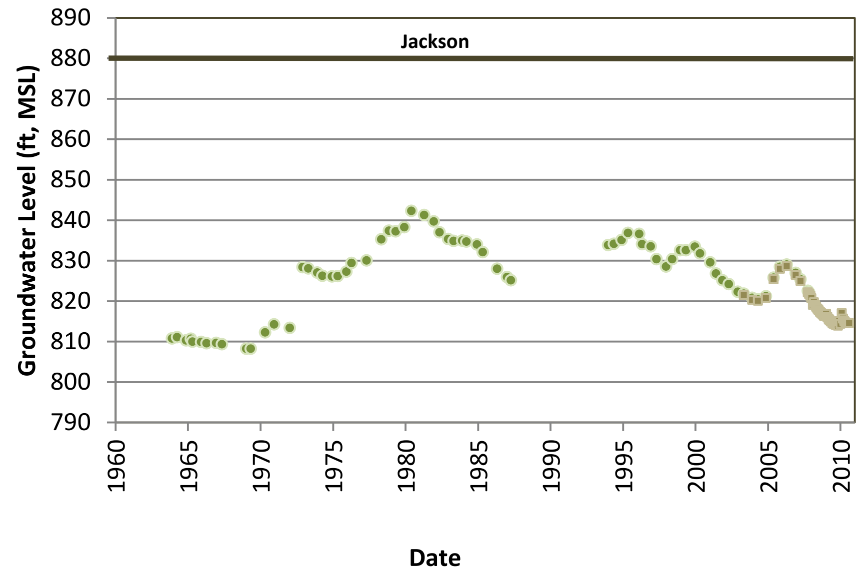
Hydrograph Locations

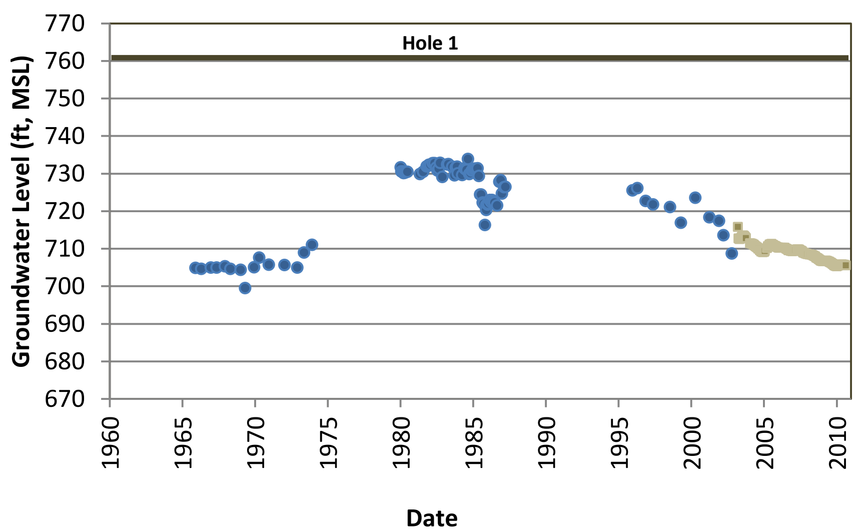
Arlington Basin Groundwater Management Plan

2010

Figure 2.7







Ground surface elevation - approximate, based on USGS digital elevation model
Groundwater level from SABRINA database
Groundwater level from AWQ database
Groundwater level from Cooperative Well Measurement Program database

WESTERN MUNICIPAL WATER DISTRICT

Selected Hydrographs

Arlington Basin Groundwater Management Plan

2010

Figure 2.8

2.3.6 GROUNDWATER QUALITY

In general, groundwater quality in the Plan Area is poor, with high TDS and nitrate concentrations (Wildermuth, 2008b). Overall groundwater quality concerns in the Plan Area, reflecting all groundwater in its untreated state, generally focus on regional non-point issues with nitrates and TDS.

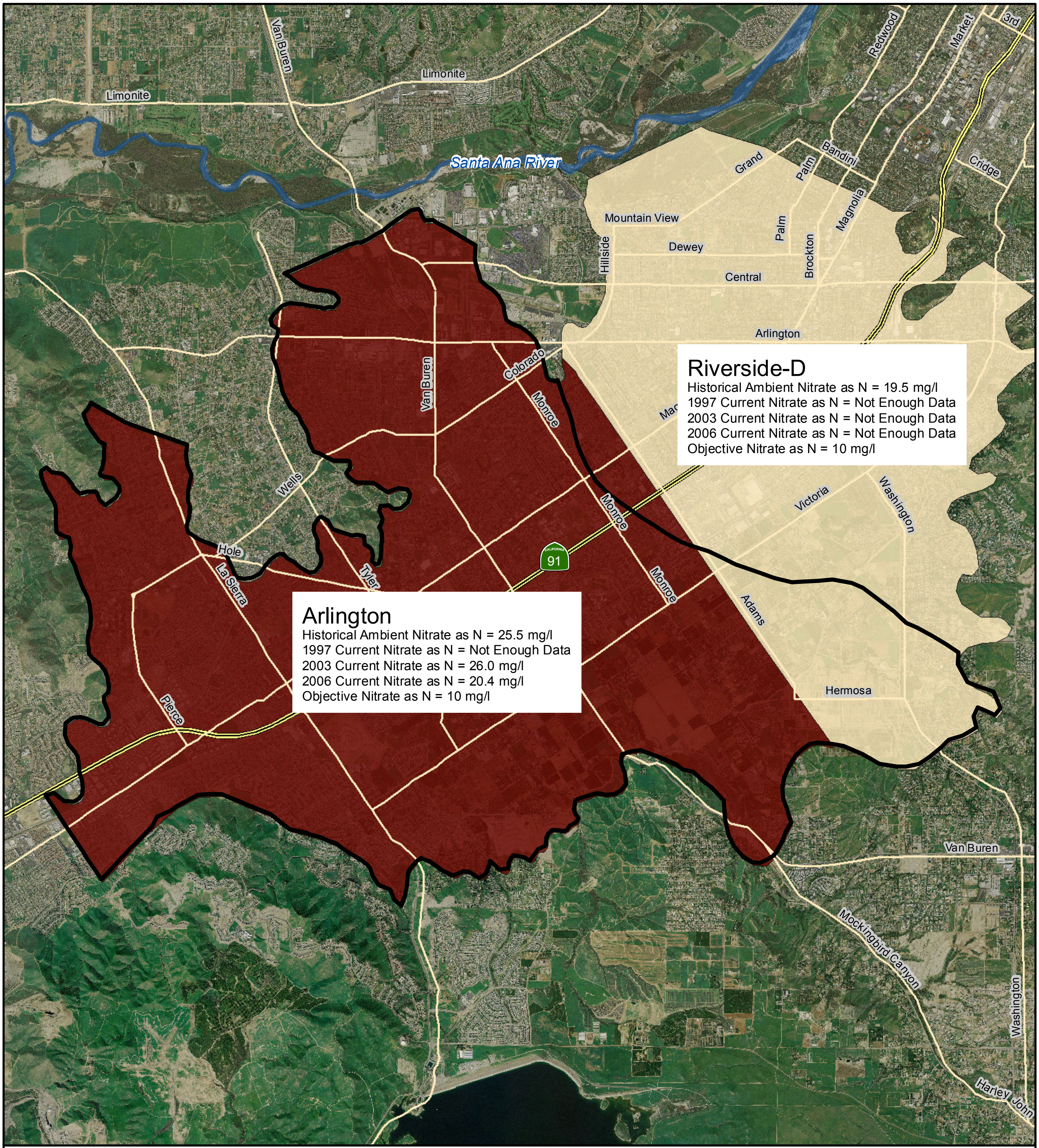
The Plan Area lies within the jurisdiction of the RWQCB, whose Basin Plan establishes the legal beneficial use designations and sets the standards to protect these uses. The Basin Plan incorporates a TDS and Nitrogen Management Plan for the Santa Ana Region, which includes the upper and lower Santa Ana River Watersheds, the San Jacinto River Watershed, and several other small drainage areas.

Within the Santa Ana watershed, which includes the Plan Area, a statistical method has been developed to use nitrate as nitrogen (N) and TDS to evaluate the status of water quality, to compare sub-basin concentrations, and to trigger management actions (RWQCB, 2004; Wildermuth, 2000, 2005, 2008b). Point statistics were used to show:

1. Historical ambient water quality conditions as represented by the 1954-1973 time period
2. 1997 Current ambient water quality conditions as represented by the 1978-1997 time period
3. 2003 Current ambient water quality conditions as represented by the 1984-2003 time period
4. 2006 Current ambient water quality conditions as represented by the 1987-2006 time period.

These point statistics were developed for Management Zones defined within the Basin Plan. The Plan Area is divided by the Basin Plan into two Management Zones, Arlington and a small portion of Riverside D, as shown on Figure 1.7. The boundaries were designed to provide "hydrologically-distinct groundwater units from a groundwater flow and water quality perspective. As such, lines delineating Management Zones were placed along impermeable barriers to groundwater flow, at bedrock constrictions, and between distinct flow systems" (Wildermuth, 2000). The boundary between Riverside D and Arlington Basin is based on a groundwater divide that is not fixed and may migrate due to recharge and extraction operations in the area. The location of the two Management Zones is shown with the water quality summaries on Figure 2.9a and Figure 2.9b.

A summary of the data is shown in Table 2.3 and on Figures 2.9a and 2.9b, indicating nitrate as N levels exceeding the Basin Plan Objective and maximum contaminant level (MCL) of 10 mg/L in Arlington for three time periods and in Riverside D for the Historical time period. Insufficient nitrate as N data are available for the other time periods.



Legend

Plan Area
Freeway
Roads

2006 Current Nitrate as N

- Not Enough Data
- < 2 mg/l
- 2 - 5 mg/l
- 5 - 10 mg/l
- 10 - 16 mg/l
- > 16 mg/l

MCL = 10 mg/l

* Water Quality Data Source: Wildermuth 2000, 2005

0 0.5 1 2 Miles

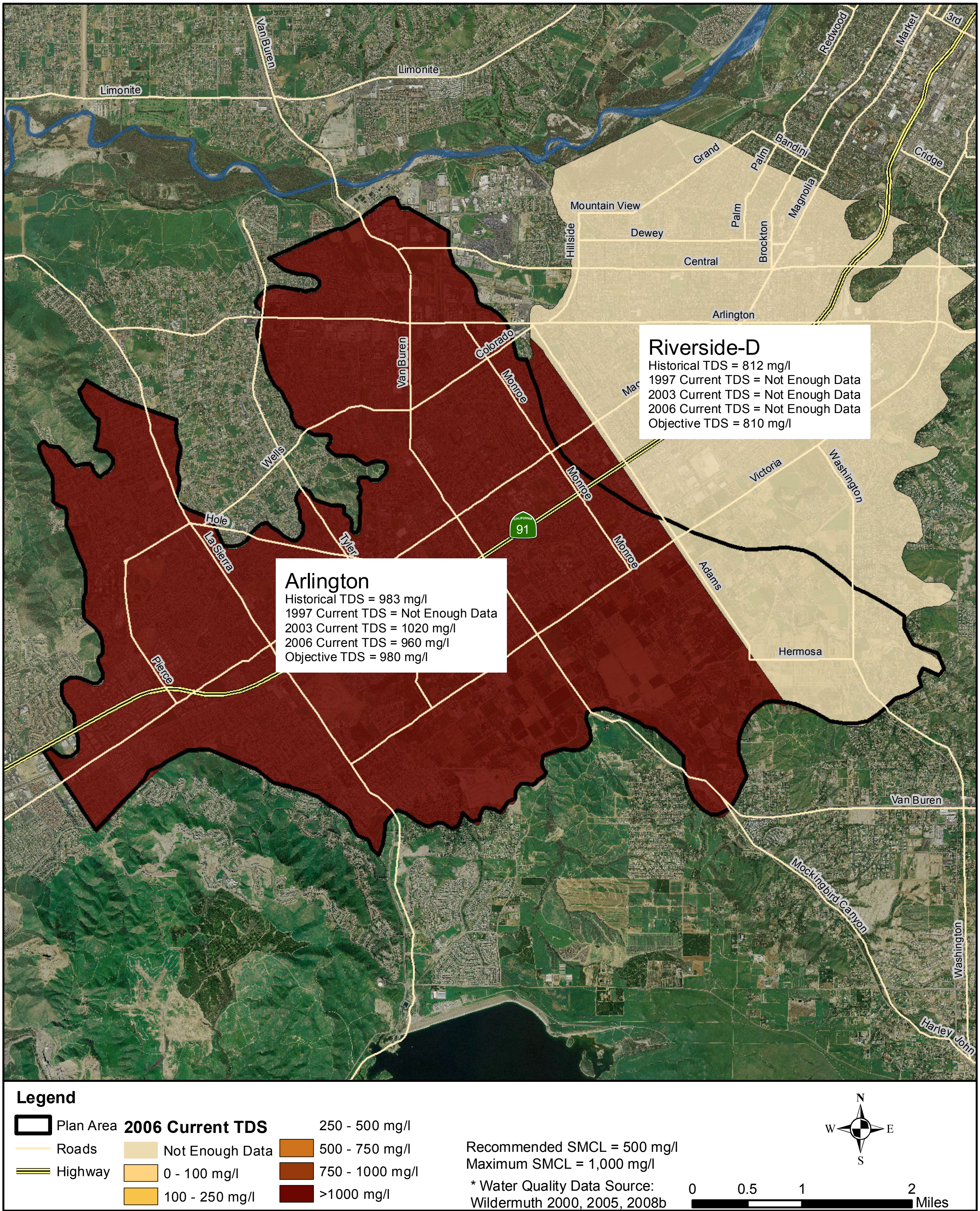
WESTERN MUNICIPAL WATER DISTRICT

Management Zone Water Quality Conditions - Nitrate as Nitrogen

Arlington Basin Groundwater Management Plan

2010

Figure 2.9a



WESTERN MUNICIPAL WATER DISTRICT

Management Zone Water Quality Conditions - Total Dissolved Solids

Arlington Basin Groundwater Management Plan

2010

Figure 2.9b

In the Arlington Management Zone, TDS exceeds the Basin Plan Objective of 980 mg/ L and the recommended secondary MCL (SMCL) of 500 mg/ L for the Historical and 2006 Current time periods. The TDS levels in the Arlington Management Zone exceeded the Basin Plan Objective and the upper SMCL (1,000 mg/ L) for the 2003 Current time period. Sufficient Arlington Management Zone TDS data are not available for the 1997 Current time period. TDS exceeds the Basin Plan Objective of 810 mg/ L and the recommended SMCL of 500 mg/ L in Riverside D for the Historical time period. Sufficient Riverside D Management Zone TDS data are not available for the other time periods.

Table 2.3
Historical (1954-1973), 1997 Current (1978-1997), 2003 Current (1984-2003), and 2006 Current (1987-2006) Ambient Nitrate as N and TDS Concentrations (mg/L)

Management Zone	**Nitrate as N [1]**					**TDS [2]**				
	Basin Plan Objective [3]	**Historical**	**1997 Current**	**2003 Current**	**2006 Current**	**Basin Plan Objective [4]**	**Historical**	**1997 Current**	**2003 Current**	**2006 Current**
Arlington	10.0	**25.5**	**?**	**26.0**	**20.4**	980	**983**	**?**	**1020**	**960**
Riverside D	10.0	**19.5**	**?**	**?**	**?**	810	**812**	**?**	**?**	**?**

? = Not enough data to estimate concentrations; Management Zone is presumed to have no assimilative capacity.
Source:
[1] Wildermuth, 2008b. (Table 3-2)
[2] Wildermuth, 2008b. (Table 3-1)
[3] RWQCB, 2004 (Table 5-4)
[4] RWQCB, 2004 (Table 5-3)

The RWQCB used these point statistics and water quality objectives to develop estimates of assimilative capacity. Management zones with assimilative capacity are able to accept waters with constituent concentrations higher than those in the receiving waters because natural processes such as recharge and dilution allow the water quality objectives to continue to be met. The most recent computations indicate that neither Arlington nor Riverside D have assimilative capacity for TDS or nitrate (Wildermuth, 2008b).

Table 2.4 shows the change in the point statistics in Arlington seen over the 30-year time period between the historical and 2006 Current time periods. Sufficient data are not available for Riverside D; Arlington shows fluctuations, but continued high levels of Nitrate as N and TDS. It should be noted that changes between these time periods are a combination of true changes in ambient water quality and artificial changes due to limitations in monitoring data and the estimation technique (Wildermuth, 2005). In the future, as monitoring programs assemble more data, a long-term record of analytical data at specific wells will better show changes over time at specific locations.

Table 2.4 Change in Ambient Concentration (mg/L) of Nitrate as N and TDS, Between Historical (1954-1973) and 2006 Current (1987-2006) Time Periods

Management Zone	Change in Nitrate as N (mg/L)	Change in TDS (mg/L)
Arlington	-5.1	-23
Riverside D	n/a	n/a

In addition to the ambient water quality concerns, contaminated groundwater from point sources can quickly remove wells from service and thus requires close coordination with regulatory agencies such as the United States Environmental Protection Agency (EPA) and the California Department of Toxic Substances Control (DTSC). Based on a search of DTSC's Envirostor database, there is one identified federal, state, military evaluation, or voluntary cleanup site with action required that is potentially affecting the aquifer system, Camp Anza. The RWQCB is the lead agency for the cleanup of Camp Anza (Envirostor ID: 33970009), which has the following potential contaminants of concern: explosives (UXO, MEC) and chlorine. A Preliminary Assessment / Site Inspection Report is due in 2010

As with all urban areas in the state, numerous Leaking Underground Fuel Tanks and Spills Leaks Investigation and Cleanup sites are in the Plan Area and are being monitored and/or remediated under the regulatory lead of the RWQCB or the Riverside County Local Oversight Program. Leaking Underground Fuel Tanks are typically at gas stations, while Spills Leaks Investigation and Cleanup sites have a variety of sources, but all involve hazardous wastes that have negatively impacted soil and/or groundwater.

2.3.7 DESALTER INFRASTRUCTURE

The existing Arlington Desalter facility, operating since 1990, extracts and treats impaired groundwater from the Plan Area in the southwestern area of the City of Riverside. The desalter facility uses reverse osmosis technology to produce up to 6 mgd of blended desalinized water, with more than 1 mgd of concentrated brine (high salinity water) generated by the plant and discharged to the Santa Ana Regional Interceptor (SARI) line, which is treated by Orange County Sanitation District and used for recharge by Orange County Water District (MWD, 2007). The desalter was managed and operated by SAWPA until the desalter assets and operations were transferred to Western in 2005. Water from the Arlington Desalter is supplied to the City of Norco to meet up to 60% of its municipal demand, as well as providing emergency supply for neighboring agencies. (Rossi, 2007; Santa Ana Watershed Project Authority [SAWPA], 2009).

The SARI line, a regional brine line designed to convey 30 mgd of non-reclaimable wastewater from the upper Santa Ana River basin to the ocean for disposal after treatment, has one branch serving the Plan Area (Reach IV-B, which serves the Arlington Desalter). The non-reclaimable wastewater consists of desalter concentrate and industrial wastewater. Proximity to the SARI line provides more options for future desalter projects.

2.3.8 GROUNDWATER/SURFACE WATER INTERACTION

As stated in Section 2.2, there are no major surface water bodies in the Plan Area. Smaller surface water bodies include several flood control basins operated by RCFCWCD. The basins capture a portion of storm runoff and allow for some of this water to percolate into the groundwater system. Additionally, the Arlington, La Sierra, and Arizona flood control channels are partially unlined, allowing for a portion of the water to seep into groundwater. The recharge from these individual sources has not been quantified.

Wildermuth (2008a) suggests that groundwater is discharged to surface water in three areas: Arizona Channel, Arlington Channel, and Hole Lake, based on persistent dry-weather flow and historical evidence of nuisance high groundwater levels in those areas.

2.3.9 SUBSIDENCE AND LIQUEFACTION

Subsidence and liquefaction are both influenced by groundwater levels and their interaction with the aquifer materials, such as sands, silts and clays. High groundwater levels can contribute to liquefaction potential, while changes in groundwater levels can contribute to subsidence.

Land subsidence here refers to the lowering of the Earth's surface as a result of groundwater level changes, not tectonic changes. Subsidence can occur from lowering and rising groundwater water levels.

Aquifers, particularly the fine-grained materials within or between the aquifers, are compressible. While most available water in aquifers is stored between larger grained soil particles, such as sands and gravels, smaller grained soil particles such as clays also hold water when saturated. If groundwater levels decrease as a result of pumping or other causes, water may be released from beds of clay or silt around the coarser materials that are the primary source of water in the aquifer. The release of water from the beds of clay and silt reduces the water pressure, resulting in a loss of support for the clay and silt beds. Unlike sands and other coarser materials, clays are compressible. Because these beds are compressible, they compact (become thinner), and the effects are seen as a lowering of the land surface (Leake, 2004). Whether subsidence through compression occurs in an area depends on groundwater levels (groundwater levels must decline) and on materials (sufficient compressible clays and silts must be present).

Subsidence can also occur from rising groundwater levels, resulting in collapsible soil hydrocompaction. Rapid collapse of up to 15% of the soil thickness can occur from a total loss of cohesion as soils saturate for the first time. Alluvial silts in semi-arid basins are most susceptible to hydrocompaction (Waltham, 2002). In Riverside County, soils most susceptible to hydrocompaction are present at the base of the mountains, where recent alluvial fan and wash sediments have been deposited during rapid runoff events. In addition, some windblown sands may be vulnerable to collapse and hydroconsolidation. Typically, differential settlement of structures may occur when lawns or plantings are heavily irrigated in close proximity to a structure's foundation (Riverside, County of, 2003).

Much of the basin is considered susceptible to subsidence (Riverside, County of, 2003), although no measurements of historical subsidence are available and no instances of damage in the Plan Area have been identified. Groundwater management within historical elevation ranges can minimize the potential impact of future subsidence.

The Plan Area also has potential for liquefaction, where earthquake-induced shaking can cause a loss of soil strength, resulting in the inability of soils to support structures. This can occur in saturated soils where shaking causes an increase in water pressure to the point where the soil particles can move easily within the soil-water matrix. Conditions in the Plan Area are most conducive to liquefaction southwest of Jackson Street and close to the hills surrounding the basin (Riverside, City of, 2007). High groundwater levels, along with appropriate soil conditions (sands or silts of uniform grain sizes), contribute to the risk of earthquake-induced liquefaction. No historical instances of liquefaction are known within the Plan Area. Limiting high groundwater levels can help reduce risks of liquefaction.

2.3.10 GROUNDWATER MONITORING

Groundwater monitoring activities in the Plan Area include monitoring groundwater levels, groundwater production, and groundwater quality. Due to the lack of historical instances of damage from subsidence, there is currently no active subsidence monitoring program.

2.3.10.1 Groundwater Level Monitoring

Groundwater level monitoring is an important component of the ongoing groundwater management in the Plan Area. Data are collected from wells in the basin and incorporated into regional groundwater level databases.

Groundwater level databases are maintained by SAWPA and Western. The two SAWPA databases described here recently were combined into one database with all data from the Basin Monitoring Program Task Force, including ambient water quality updates, Total Maximum Daily Load task forces, and groundwater well quality and levels. The details of these databases are as follows:

- Cooperative Well Measuring Program Database - Maintained by Western, this database includes data from 74 cooperating agencies and firms and their nearly 4,500 wells in the Upper Santa Ana, San Jacinto and Santa Margarita Watersheds. Groundwater level data in this database are available from 1993 to present and include fall and spring measurements. Data are available in various other formats under the Cooperative Well Measuring Program from 1964 to present.
- Santa Ana Basin Relational Information Network Application (SABRINA) database - Maintained by SAWPA, this database contains monitoring data for 10,000 wells in the Santa Ana River Watershed and surrounding areas. Groundwater level data are available from 1904 to 2003. The SABRINA database is used to share groundwater monitoring data between agencies for groundwater management and geographic information system analysis.
- Santa Ana Watershed Data Management System (SAWDMS) – Maintained by SAWPA, this database covers most of the Santa Ana River Watershed with groundwater level data available from the 1910 to present. The SAWDMS contains over 765,000 records related to approximately 6,600 wells in the Santa Ana Watershed and appurtenant groundwater basins. The SAWDMS is used primarily to reflect and store the triennial reports on water quality and water levels (Cozad, 1998; S. Mains, pers. comm., February 4, 2009; M. Norton, pers. comm, October 12, 2011).

2.3.10.2 Groundwater Production Monitoring

Groundwater production in the Plan Area is monitored through water recordation filings submitted to the California State Water Resources Control Board (SWRCB) as part of the Annual Notices of Groundwater Extraction and Diversion Program. Starting in 2005, the SWRCB transferred authority for this program to local agencies, including Valley District, San Gorgonio Pass Water Agency, and Western for the Plan Area and surrounding watersheds. Filings are made in compliance with Water Code Sections 4999 et seq., which requires filing, with few exceptions, by persons who extract more than 25 AF of groundwater from wells in Riverside, San Bernardino, Los Angeles, or Ventura Counties.

These filings are compiled into annual Water Extractions Reports by the local cooperating agencies: Valley District, San Gorgonio Pass Water Agency, and Western.

2.3.10.3 Groundwater Quality Monitoring

Groundwater quality is monitored to meet the California Department of Public Health's requirements specified in Title 22 of the California Code of Regulations. These requirements apply to active municipal productions wells.

A significant ambient groundwater quality reporting program for nitrate as N and TDS was developed and is maintained by SAWPA. The program compiles groundwater quality data and develops point statistics for the two defined Management Zones in the Plan Area (see Figure 1.7). The RWQCB's Basin Plan incorporates the ambient water quality monitoring program, with objectives defined for each Management Zone.

2.3.11 SUBSIDENCE MONITORING

Due to the lack of historical instances of damage from subsidence, there is no active subsidence monitoring program.

2.4 IMPORTED WATER

Imported water in the Plan Area, from the SWP and to a lesser degree the Colorado River Aqueduct, is supplied by Western. Western is a wholesale purchaser of imported water with contractual rights to imported water from Metropolitan, and provides this water to the other retail water suppliers. Corona utilizes imported water for approximately 44% of its total water supply (Western, 2008b). RPU purchases small quantities (40 AF in 2008, 0 AF in 2009) of treated imported surface water from Western to meet peak demand needs in the higher elevations of the RPU service area. RPU has a contractual agreement with Western for 30 cubic feet per second of imported water and takes deliveries through several service connections. RPU obtained a maximum of 5,493 AF of water through the Mills Connection (in 1990) and 4,986 AF of water through the Van Buren Highline (in 1999) (RPU, 2005). These values apply to the RPU service area as a whole, including the Arlington and Riverside Basins. Western uses imported water to meet the demands for its retail customers in the Plan Area, as well as retail and wholesale demands outside the basin. Imported water is treated at the Mills Filtration Plant and is also delivered untreated to the retail agencies.

Metropolitan uses ozone, a state-of-the-art water treatment technology, as the primary disinfectant in its Mills Treatment Plant. The water is also disinfected with chloramines. Chloramines, a combination of chlorine and ammonia, prevent re-growth of potentially harmful bacteria in the water distribution system. The water, sourced from the SWP, is high quality, meeting or exceeding all state and federal standard and with an average TDS of 291 parts per million (ppm) and average nitrate of 0.7 ppm (Metropolitan, 2008). Consumer Confidence Reports are included in Appendix C.

2.5 RECYCLED WATER

Wastewater collection in the Plan Area is performed by the City of Riverside, Corona, Home Gardens Sanitary District, and the Western Riverside County Regional Wastewater Authority (WRCRWA).

The Riverside Public Works Department operates a comprehensive wastewater collection, treatment, and disposal system that serves most of the City of Riverside, as well as portions of the sphere of influence area and, under contract, the unincorporated communities served by the Jurupa, Rubidoux, and Edgemont Community Services Districts. The Riverside Public Works Department also serves the unincorporated community of Highgrove through an agreement with Riverside County. Western is responsible for collection and treatment of wastewater flows only in a small portion of the City of Riverside. Historically, the Riverside Public Works Department and Western have cooperatively determined which agency can best serve an area with water and wastewater services. This arrangement has led to a mixing and matching of service providers. The city's wastewater collection system includes over 102.7 miles of gravity sewers and 18 wastewater pump stations and serves 280,000 residents of Riverside and other communities (Riverside, 2007).

Corona operates four wastewater treatment plants with a combined existing capacity of 15.5 mgd and an ultimate capacity of 20.5 mgd. Sewer service is provided to 33,967 connections within 22,144 acres that include Corona and the unincorporated El Cerrito area. Existing flows average approximately 10.5 mgd (Riverside Local Agency Formation Commission [LAFCO], 2005). Corona's primary wastewater treatment plant, the Corona Water Reclamation Plant, is located near the Santa Ana River along Railroad Street, a significant distance from the Plan Area.

Home Gardens Sanitary District provides wastewater collection and treatment within a 672-acre service area with 2,438 wastewater service connections. The sewer collection system is entirely gravity flow and the District owns one wastewater treatment plant, which is operated by the WRCRWA (Riverside LAFCO, 2005).

Western is a member agency of the WRCRWA and the contract operator of the Western Riverside County Regional Wastewater Treatment Plant (WRCRWTP), an 8 mgd plant capable of producing tertiary treated recycled water. WRCRWA is a public agency created to plan, construct, and operate a cost effective regional wastewater reclamation treatment and collection system. Wastewater from Western's retail and wholesale customers, the City of Norco, Jurupa Community Services District, and Home Gardens Sanitary District are treated at WRCRWA's wastewater plant (Western, 2009a).

2.5.1 TREATMENT PLANTS

Wastewater in the Plan Area is treated by the Riverside Regional Water Quality Treatment Plant (RWQTP) and the WRCRWTP.

2.5.1.1 Riverside Regional Water Quality Treatment Plant

The Riverside (RWQTP) at 5950 Acorn Street in Riverside provides tertiary treatment for sanitary sewer service for 280,000 residents in the City of Riverside and Jurupa, Edgemont, and Rubidoux communities. It consists of two secondary treatment plants, one tertiary treatment plant, and sludge handling facilities. Approximately 50 acres of wetlands were previously used for additional treatment at Hidden Valley Wetlands. The effluent from the plant is largely discharged to the Santa Ana River, with a limited volume reclaimed for beneficial use. The effluent released to the Santa Ana River is available for groundwater recharge below Prado Dam. Effluent discharged into Reach 3 of the Santa Ana River from the RWQTP in water year

2008-2009 was 33,636 AF (Santa Ana River Watermaster, 2010). According to the Santa Ana River Judgment, base flow in the Santa Ana River must be maintained at 15,250 AFY at Riverside Narrows and 42,000 AFY at Prado Dam (with adjustments based on quality) to meet commitments (*Orange County Water District vs. City of Chino et al.,* 1969). The tertiary treatment provides high-quality, dechlorinated water for these uses. In 2008, the plant had a capacity of 40 mgd, an average daily flow of 32 mgd, and an average peak flow of 36 mgd. Capacity is not anticipated to be reached before 2025. A planned expansion will allow the facility ultimately to treat 52.2 mgd of wastewater (Jones & Stokes, 2006; Riverside, City of, 2007).

2.5.1.2 Western Riverside County Regional Wastewater Treatment Plant

The WRCRWTP is located at 14634 River Road in Corona. The plant is operated by Western for the WRCRWA, which includes member agencies City of Norco, Home Gardens Sanitary District, Western Municipal Water District, Jurupa Community Services District, and the Santa Ana Watershed Project Authority. It is a tertiary facility capable of providing water for reuse or for discharge through an outfall to the Santa Ana River. The plant was brought online in 1998 and has a design capacity for 8 mgd with the capability for expansion to 32 mgd. This facility performs high levels of treatment through a number of consecutive wastewater treatment processes. Wastewater from a portion of Western's customers, the City of Norco, Jurupa Community Services District, and Home Gardens Sanitary District, is collected through many miles of pipelines, pumped to the treatment plant, processed and discharged into the Santa Ana River (Western, 2009a). Effluent discharged to the Santa Ana River from the WRCRWA plant in water year 2008-2009 was 6,374 AF (Santa Ana River Watermaster, 2010).

The plant currently operates with a live stream discharge to Reach 3 of the Santa Ana River, but with a recycled water distribution system it can provide recycled water to the City of Norco and to the Jurupa Community Services District service area. The WRCRWA is in the early planning stages of an expansion project to 11-14 mgd capacity and in the final planning stages of providing recycled water to the City of Norco, however, distribution infrastructure is required in the City (SAWPA, 2009).

2.5.2 Recycled Water Infrastructure and Users

The City of Riverside operates a small recycled water system composed of 8-inch and 12-inch diameter distribution mains, including recycled water pipelines under Van Buren Boulevard and Doolittle Avenue. Riverside supplies approximately 290 AFY of recycled water near the boundary with the Riverside Basin in the northern part of the Plan Area. Customers include the Van Buren Golf Center, Van Buren Urban Forest, and Toro Manufacturing Company (Jones & Stokes, 2006). Corona also operates a recycled water system, but the customers are all outside of the Plan Area.

2.5.3 Recycled Water Quantity and Quality

Currently, the Riverside RWQTP operates under the NPDES permit designated as Order No. 1-3, NPDES No. CA0105350 with Adoption Order No. R8-2006-0009. This permit includes requirements that implement the Santa Ana River Basin Plan. Effluent quality standards require tertiary treatment with filters and disinfection equivalent to Title 22 requirements for recycled water because of use of receiving waters for water contact recreation. The Riverside RWQTP produces effluent that consistently conforms to the Title 22 requirements. Data from 2001 showed average effluent TDS of 520 mg/L. The 36,000 AFY of effluent from the plant far exceeds existing recycled water distribution capacity (Parsons, 2003; Jones & Stokes, 2006).

Currently, effluent from the WRCRWA plant is not recycled for direct reuse. However, usage of recycled water from the plant is anticipated in the future, with projections showing 6,000 AFY of recycled water use by 2030 (Western, 2008b).

The quality of recycled water for future recycled water users will meet regulatory guidelines and will also meet the unique needs of specific users through blending or treatment techniques.

Discharge of treated effluent into the Santa Ana River is an important component of meeting the annual delivery of base flow as mandated in the Santa Ana River Judgment: 42,000 AFY at Prado Dam and 15,250 AFY at Riverside Narrows. Discharge from the RWQTP and WRCRWA are both downstream of Riverside Narrows and upstream of Prado Dam. The Santa Ana River Judgment is a physical solution adopted by the Court to resolve claims of inter-basin allocation of obligations and rights in the Santa Ana Watershed.

3 WATER REQUIREMENTS AND SUPPLIES

An understanding of the historical, current, and projected water requirements and supplies is important for ongoing groundwater management. By determining how water purveyors and private users meet their demands and how those supplies and demands are projected to change, potential stresses on the groundwater basin can be recognized and potential opportunities for improved management of the groundwater resource can be realized.

3.1 CURRENT AND HISTORICAL WATER REQUIREMENTS AND SUPPLIES

Water supplies in the Plan Area have shifted over the latter half of the 20th century from meeting a largely agricultural demand to meeting a largely urban demand. Citrus acreage in the Riverside area reached its largest extent in the early 1940s at 12,000 acres and has declined dramatically since that time. Today, approximately 2,200 acres of citrus remain within the boundaries of the City of Riverside, largely within the Arlington Heights greenbelt. Riverside's population grew as the citrus acreage increased from the late 1800s through the 1940s. However, the population increased even more rapidly after World War II as urbanization replaced citrus acreage with homes and businesses (Salazar, 1997). The City of Riverside's population increased from 3,000 in 1883 (Holmes, 1912), 13 years after the settlement's founding, to approximately 293,761 residents today (United States Census Bureau, 2009). Areas surrounding the City of Riverside have seen similar conversions from agriculture to urban uses. Water suppliers have shifted from providing primarily agricultural water to primarily urban water, while continuing to utilize the existing assets such as wells and conveyance systems and continuing to support local agricultural interests. Private groundwater pumpers use groundwater from the Plan Area to meet all or a portion of their demands, and Western uses Plan Area groundwater to meet wholesale demands outside the Plan Area.

Groundwater production in other basins and other water supply sources are also used to meet demands in the Plan Area. The agencies that supply water to the Plan Area also have groundwater production wells within the Bedford, Bunker Hill, Coldwater, Rialto-Colton, Riverside, and Temescal Basins. Similarly, some groundwater pumped in the basin is served outside the basin, specifically Norco's usage of water from the Arlington Desalter. Imported water and recycled water complete the historical supply mix. Wholesale imported water for agency use is provided by Western. Table 3.1 summarizes the water supply sources for entities based on 2009 data. This table includes private producers, Western's Arlington Desalter, as well as RPU, the only other water purveyor with a significant portion of its service area within the Plan Area. Approximately 27% of RPU's service area is within the Arlington Basin.

Table 3.1 includes the full water supply for RPU, although its service area extends beyond the Plan Area boundaries. Agencies without a significant portion of their service areas in the Plan Area are not included:

- Western North and South Service Area (1% within the Plan Area)
- Corona (1% within the Plan Area)

Details for each agency are provided by agency in Section 3.1.3.

Table 3.1 Summary of Current Water Supply Sources for Entities Overlying the Plan Area

Agency	Supply (AFY)				
	Plan Area Groundwater	Other Groundwater	Imported Water	Recycled Water	Total
RPU	0	84,750	0	137	**84,890**
Western - Arlington Desalter	6,935	0	0	0	**6,935**
Private Producers	1,668	0	0	0	**1,668**
Total	**8,603**	**84,750**	**0**	**137**	**93,493**

Valley District and Western, 2010.

Water demand in the Plan Area is higher in the summer months than in the winter months, primarily due to the climatic conditions discussed in Section 2.1. The current water supply facilities are capable of meeting demands throughout the year, including extremely hot, dry days with very high water use. The typical monthly water demand distribution is shown on Figure 3.1.

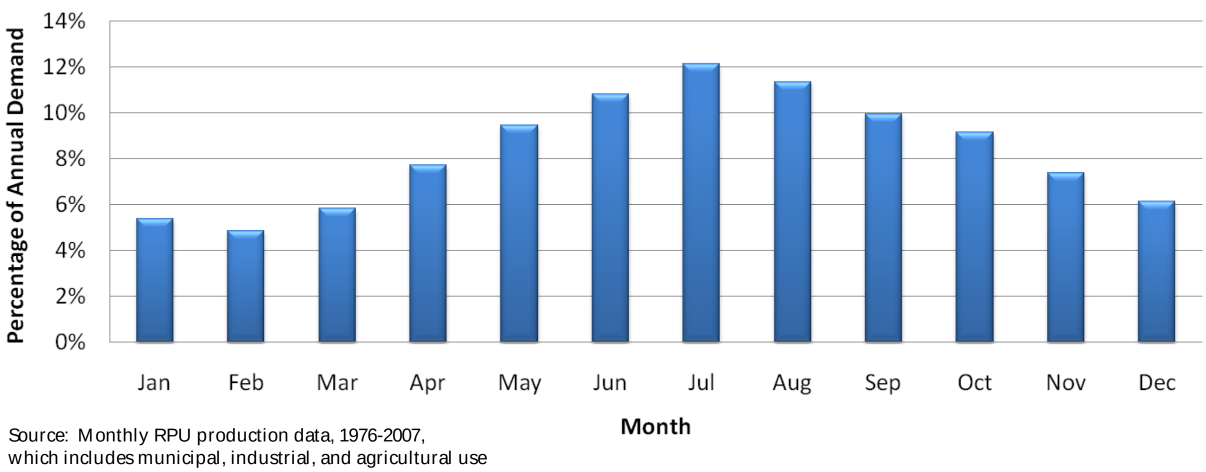


Figure 3.1 Average Monthly Distribution of Annual Demand

Details on water use by agency are presented in the following sections. Data are available from the individual agency Urban Water Management Plans, directly from agency staff, from the Western IRWMP, and from historical groundwater production records from the database used to develop Water Extraction Reports by Valley District and Western. These available data sources were used to summarize the supply sources, quantify the current supply mix, and quantify historical groundwater production. Historical conditions are represented by Plan Area groundwater production data from the Water Extraction Report database for 1965 – 2009. Current conditions are represented by 2009 data, where available, from the Water Extraction Report database for Plan Area groundwater and through personal communication with the water agencies for remaining supply sources, such as imported water, recycled water, and groundwater from outside the Plan Area. Where data were not available for 2008 or 2009, information from the 2008 IRWMP was utilized.

3.1.1 SUPPLY MIX

Details on water demand and supply by the water agencies and private groundwater producers are presented in the following sections.

3.1.1.1 Riverside Public Utilities

Riverside Public Utilities (RPU) provides water to 64,000 services (298,000 customers) within a service area of 74 mi^2 (Figure 1.3), of which approximately 5 mi^2 are outside the Riverside city limits.

Riverside's water supply is nearly entirely groundwater, produced from the Bunker Hill Basin in San Bernardino County and the Riverside Basin in San Bernardino and Riverside Counties, with minor production in the Colton Basin. The remainder is imported water from Western and recycled water.

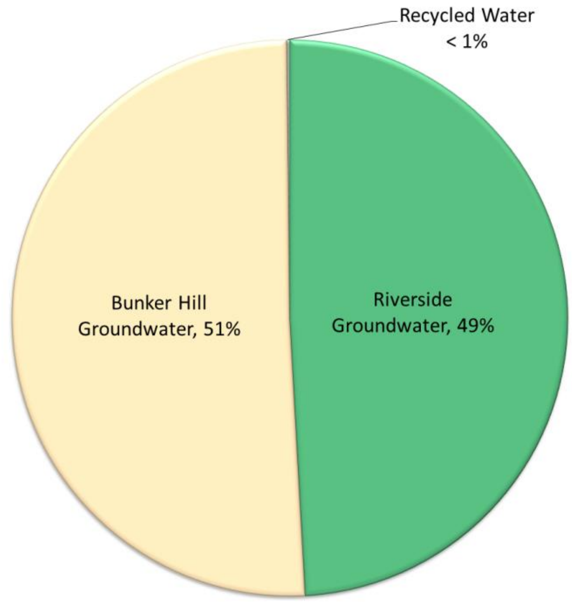


Figure 3.2 Current Water Supply Sources, RPU

Riverside Public Utilities' current strategy for groundwater production is to fully utilize the 53,426 AFY entitlement (including entitlements through share ownership in mutual water companies) to export water from the Bunker Hill Basin (RPU, pers. comm., December 3, 2009) and extract approximately 40,000 AFY from the Riverside Basin to meet remaining demands. Efforts to meet this strategy results in a current supply mix that is 51% groundwater from Bunker Hill Basin and 49% groundwater from Riverside Basin. Recycled water continues to be a small component of the current water supply, less than 1%.

RPU has not produced groundwater from the Plan Area since 1996. 2009 supply sources are shown on Figure 3.2 and include groundwater from the Riverside and Bunker Hill Basins as well as imported and recycled water.

Historical groundwater production from the Plan Area is discussed in Section 3.2.2.

3.1.1.2 Western Municipal Water District

Western was formed by the voters in 1954 to bring supplemental water to growing western Riverside County. Today, Western serves more than 25,000 retail customers in Riverside and Murrieta and nine wholesale customers with water from both the Colorado River and the SWP as a Metropolitan member agency. Approximately one-quarter of the water Western purchases from Metropolitan comes from the Colorado River Aqueduct and about three-quarters from the SWP, which transports water from Northern California via the California Aqueduct (Western, 2008b). Western also imports a small quantity of non-potable groundwater from the Riverside/ San Bernardino area through a contract between Western and Elsinore Valley Water District. Western's only groundwater production is from the Arlington Desalter wells in the Plan Area.

Supplemental water also comes from the City of Riverside through the Mockingbird connection, when water is available.

Western is one of five member agencies in SAWPA, a regional water resources planning and project implementation organization. Western's general manager is a court-appointed Watermaster, responsible for reporting compliance with water quality and quantity provisions of court orders regarding water rights issues in the Santa Ana Watershed.

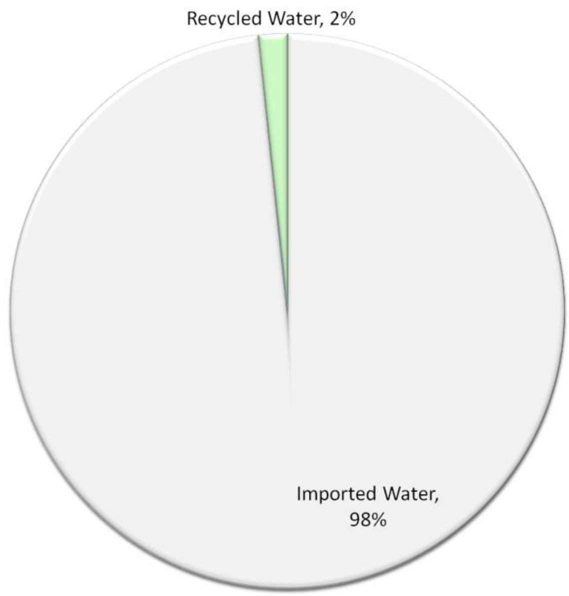


Figure 3.3 Current Water Supply Sources, Western –North and South Retail Area

Western's general district includes 510 mi^2 in western Riverside County and a population of more than 850,000 people. Western currently sells over 100,000 AF of water annually. Improvement districts, the retail portion of Western's general district, cover approximately 73 mi^2 and Western's retail service provides water to an estimated population of approximately 80,000, based on 3.2 persons per household for about 25,000 residential domestic services (Western, 2008b).

One improvement district, the North and South Retail Area, serves a small portion of the Plan Area. However, only about 1% of the service area of the North and South Retail area is within the Plan Area, with the remainder of the service area to the south and east of the Plan Area. In 2009, the North and South Retail Area received approximately 30,700 AF of imported water and 800 AF of recycled water. The recycled water use was entirely outside of the Arlington Basin. (Western, pers. comm., February 7, 2011)

Current supply mix data are presented on Figure 3.3 for the full service area of the North and South Retail Area, based on the 2009 supply mix.

3.1.1.3 City of Corona

Corona serves approximately 150,000 customers in a 45-mi^2 service area both inside the city limits and in parts of unincorporated Riverside County (Western, 2008b). Only 1% of Corona's service area and city limits overly the Plan Area (Figures 1.2 and 1.3). Corona does not currently produce groundwater from the Plan Area, nor has it historically.

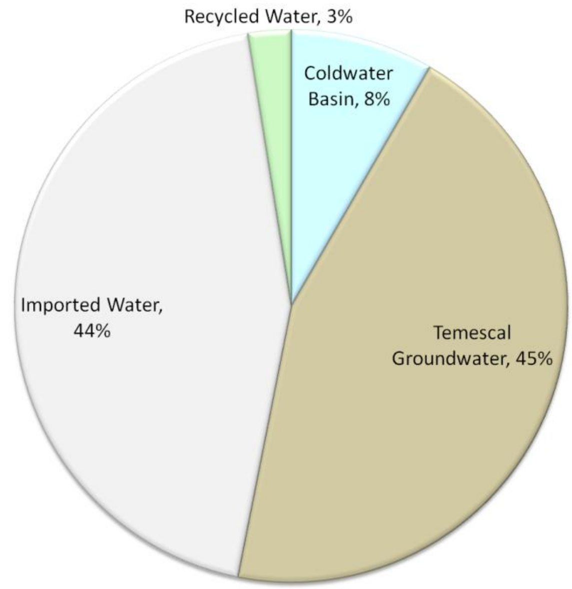


Figure 3.4 Current Water Supply Sources, Corona

Corona currently operates and maintains 21 active potable groundwater production wells, three water treatment plants receiving Colorado River water, and a connection to the SWP on the Mills (Woodcrest) Pipeline from Metropolitan's Mills Water Treatment Plant. Imported water from Metropolitan is delivered to Corona via three Western service connections on Metropolitan's Lower Feeder, which transverses Corona on an east-west alignment along Chase Drive and south of Green River Drive and its western projection. The untreated Colorado River water is distributed to Corona's Lester Water Treatment Plant, Sierra del Oro Water Treatment Plant, and Green River Water Treatment Plant (Western, 2008b). The Green River Water Treatment Plant was deactivated in 1996 and is now used only for emergencies (Corona, 2004).

In 2006, Corona began serving recycled water to its customers and currently has 57 connections using, on average, 1.4 mgd (Western, 2008b). Corona's infrastructure for the recycled water program consists of approximately 27 miles of pipeline, three storage reservoirs, and three pump stations. The recycled water system will produce approximately 6 mgd of recycled water. This water will then be used for the irrigation of golf courses, local parks, landscape maintenance districts, schools, and freeway landscaping (Western, 2008b).

As shown on Figure 3.4, groundwater accounts for 53% of Corona's water supply: 45% from Temescal Basin (immediately to the southwest of Plan Area) and 8% from Coldwater Basin (not adjacent to the Plan Area) (Western, 2008b). Corona's groundwater activities are managed through the AB3030 GWMP completed in June 2008 (Corona, 2008), which has goals of operating the groundwater basin in a sustainable manner for future beneficial uses and increasing the reliability of the water supply for basin users.

3.1.2 PRIVATE GROUNDWATER PRODUCERS

Private groundwater producers in the Plan Area pump groundwater for agricultural uses, irrigation for landscaping, irrigation for athletic fields, and other uses. These users currently use groundwater to meet all or a portion of their demand. Other supply sources are included in the data from the agency providing water to the customer.

3.1.3 TOTAL PLAN AREA WATER SUPPLY

Current and historical water demands in the Plan Area have been met through a combination of supplies, including groundwater pumping within the Plan Area, groundwater pumping outside the Plan Area (Bunker Hill, Riverside, and Temescal Basins), imported water, recycled water, and others. Figure 3.5 shows the current water supply mix for the Plan Area, summarized from the previous sections for private producers and RPU, the only retail agency with a significant portion of their service areas within the Plan Area. Values shown in Figure 3.5 represent 2009 data.

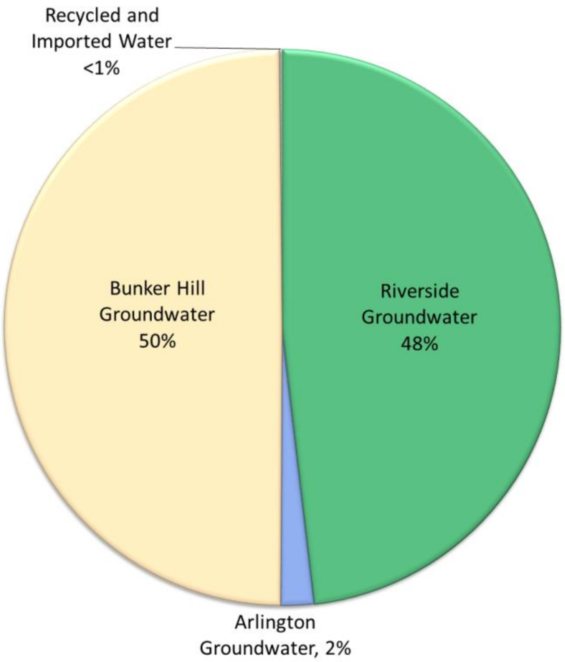


Figure 3.5 Current Water Supply Sources, Plan Area

3.2 GROUNDWATER PRODUCTION WITHIN THE PLAN AREA

Groundwater is produced in the Plan Area for use within and outside of the basin. Groundwater is produced for use within the basin by private producers (currently Bureau of Indian Affairs, La Sierra University, Loving Homes Greens Homeowners Association, and the Riverside Master Homeowners Association) and, historically, by RPU. Western's Arlington Desalter produces groundwater for delivery outside the Plan Area, currently to the City of Norco.

3.2.1 PRIVATE GROUNDWATER PRODUCERS

Private groundwater producers in the Plan Area pump groundwater for agricultural uses, irrigation for landscaping, irrigation for athletic fields, and other uses.

Historical use of Plan Area groundwater by private groundwater producers has averaged 2,300 AFY from 1965 to 2009, with relatively higher production prior to 1976, as shown on Figure 3.6 (Valley District and Western, 2010). Production from 1965 to 1969 also includes an average of 684 AFY of production by Riverside County. The data, shown in Figure 3.6, include the following current and/ or historical users, which represent all known major private producers at the time of publication:

Arlington Mutual Water Company	La Sierra University
Cardey, Max L.	Lease Associated-Courtesy Escrow
City National Bank Trustee	Lordon Management
Dept. of Interior, Bureau of Indian Affairs	Loving Homes Greens Homeowners
Firestone Syndicate	Reynolds, Harry C.
Gem's Cabinet Shop	Sweaney Group Arlington Heights Citrus
Hamner, J.A.	Teunissen, Fred J.
Koning, Walt & Cory	Watje, Theodore
Kartz, John D.	

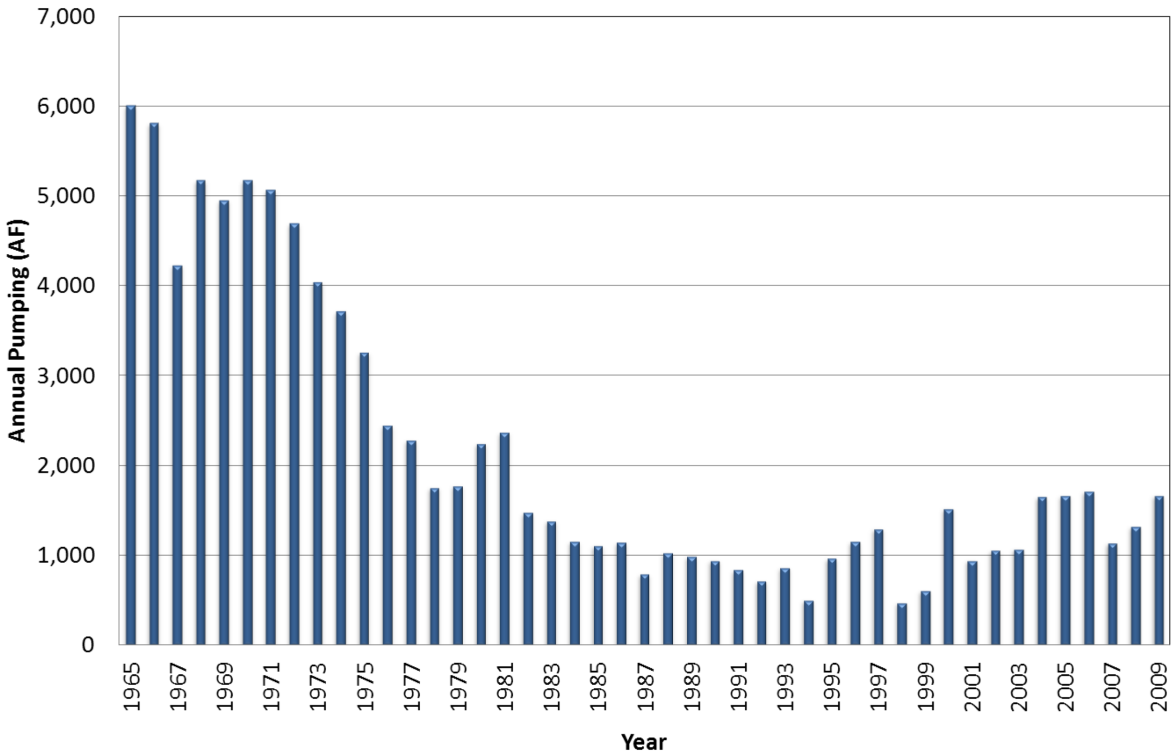


Figure 3.6 Historical Annual Plan Area Groundwater Production by Private Producers

3.2.2 RIVERSIDE PUBLIC UTILITIES

Riverside Public Utilities has not produced groundwater from the Plan Area since 1996. In and before 1996, RPU produced, on average, 1,545 AFY from the Plan Area, with higher production levels from 1965 to 1973 (4,384 AFY) than from 1974 to 1996 (434 AFY). Annual production from the Plan Area is shown on Figure 3.7, based on production records from the Water Extractions Reports (Valley District and Western, 2010).

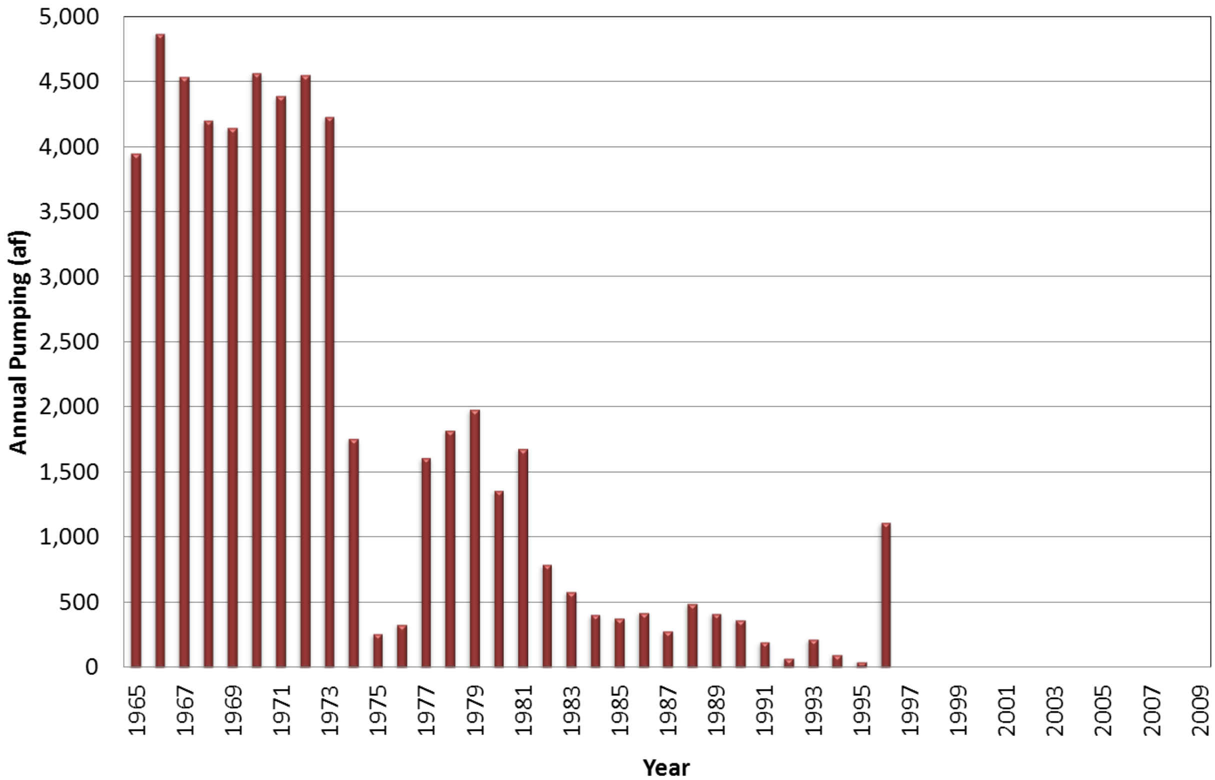


Figure 3.7 Historical Annual Groundwater Production from the Plan Area by Riverside Public Utilities

3.2.3 WESTERN MUNICIPAL WATER DISTRICT

Western is the sole water agency currently producing groundwater from the Plan Area; other producers are all private entities. Western's Arlington Desalter currently has five wells and a planned expansion may add additional production wells (Wildermuth, 2008a). The Desalter supplies water to Norco and can be an emergency supply for Western's North and South Retail Area (Western, 2005). In 2009, the Arlington Desalter produced 5,593 AF of water from 6,935 AF of pumped groundwater, with 1,100 AF of salt concentrate discharged into the Santa Ana Regional Interceptor for disposal. In 2010, the Desalter produced 4,597 AF of water from 6,030 AF of pumped groundwater, with 1,004 AF of salt concentrate discharged. (Western, pers. comm., February 7, 2011). Historical groundwater production for Western's Arlington Desalter, shown on Figure 3.8, began in 1990 and has averaged 5,700 AFY (Valley District and Western, 2010). Western purchased the desalter from SAWPA in 2005.

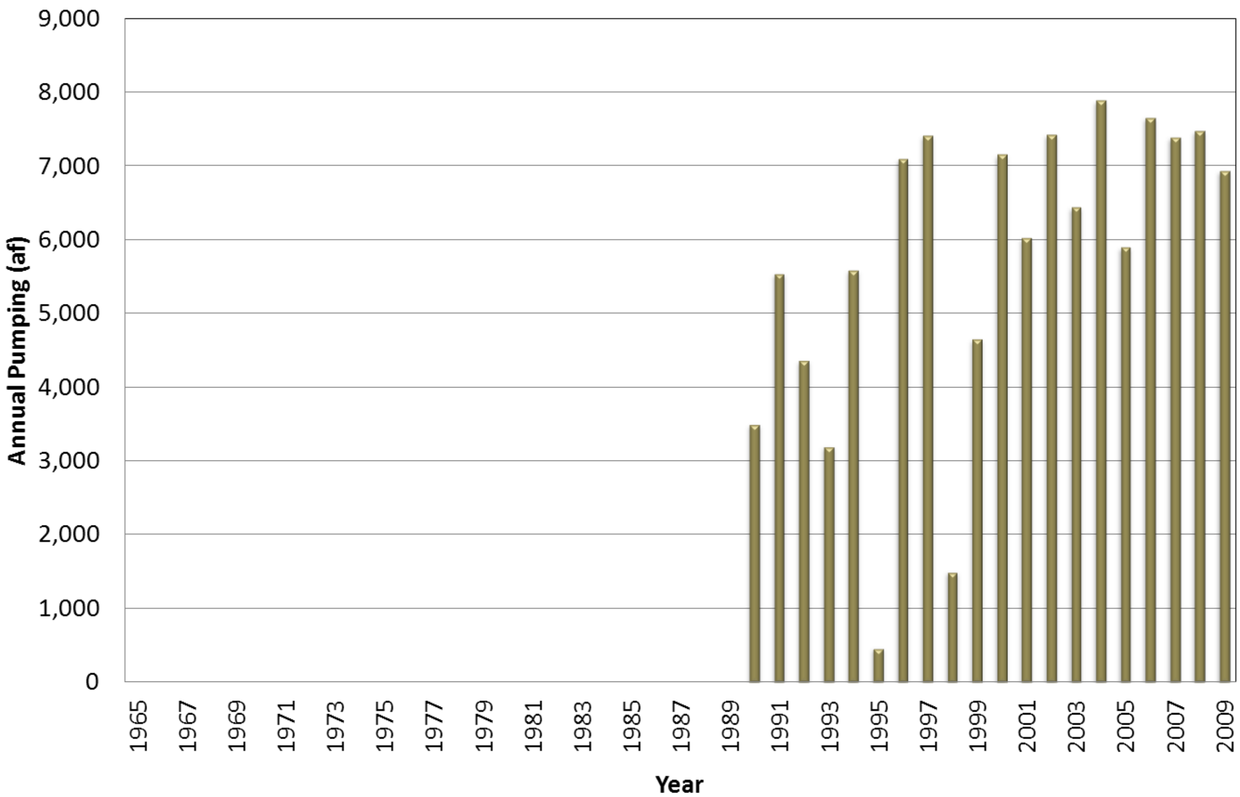


Figure 3.8 Historical Annual Plan Area Groundwater Production, Arlington Desalter

3.2.4 TOTAL PLAN AREA GROUNDWATER PRODUCTION

Plan Area groundwater provides an important source of water for private groundwater producers, as well as a source of water for Western's Arlington Desalter.

Figure 3.9 shows total annual groundwater production in the Plan Area by major producer. Figure 3.10 shows the distribution of recent (average of 2005 through 2009) groundwater production throughout the basin. In 2009, total groundwater production from the Plan Area was 8,603 AF (Valley District and Western, 2010).

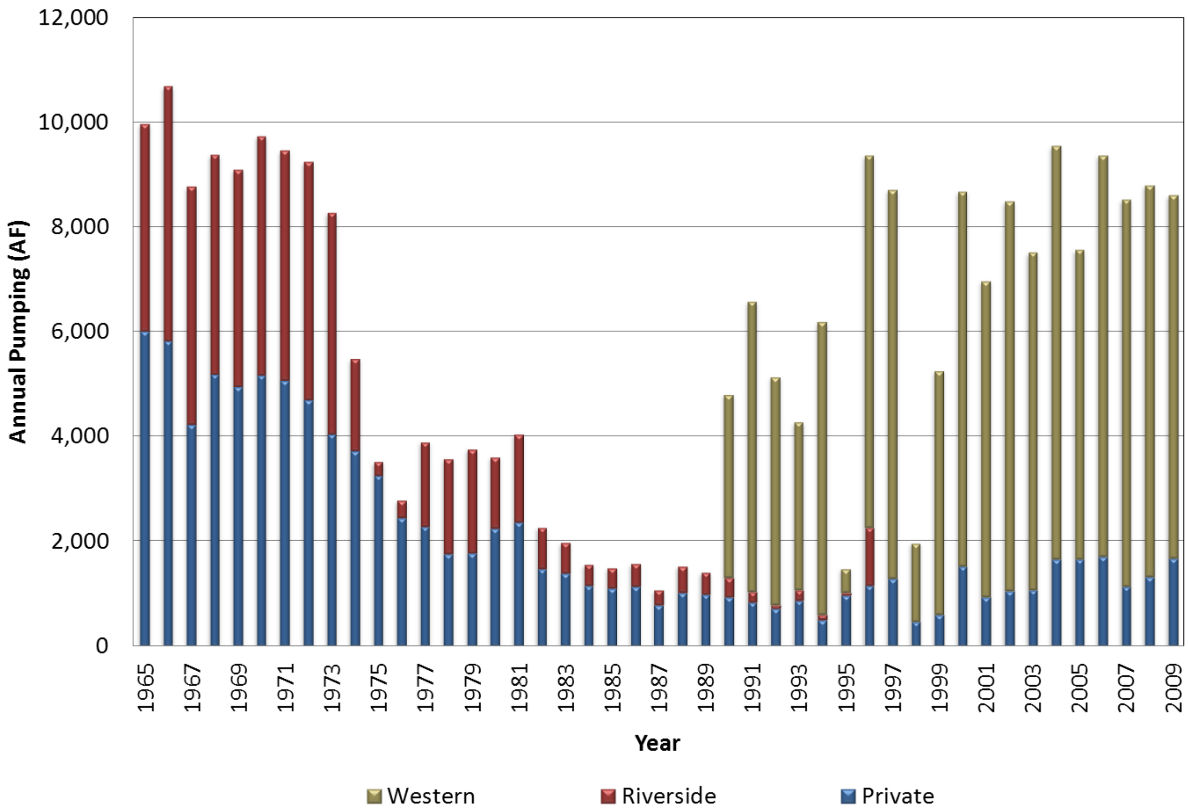
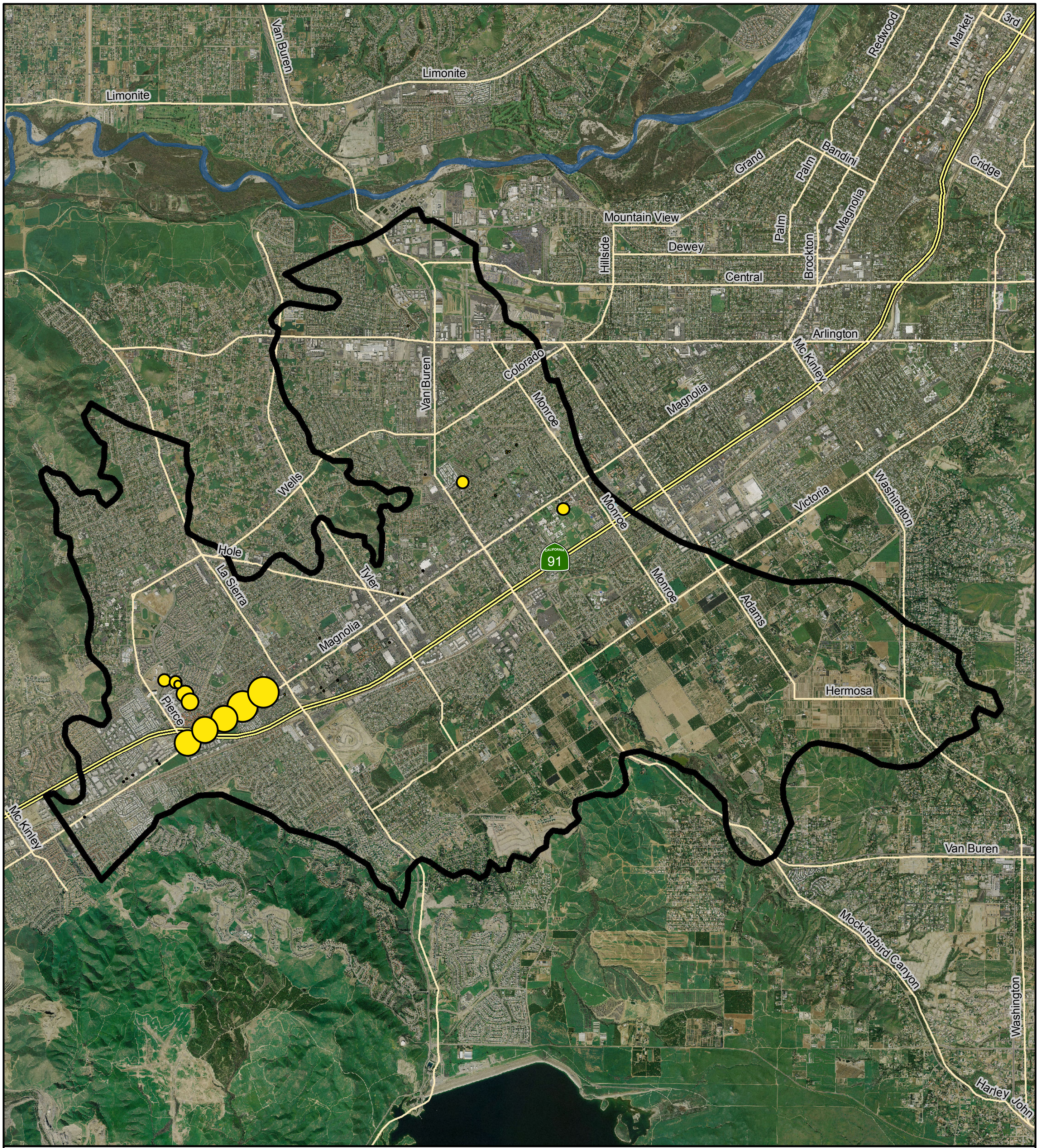


Figure 3.9 Historical Annual Plan Area Groundwater Production by Agency



Legend

Plan Area

Highway

Roads

Groundwater Production (afy)*

- 1 - 100
- 101 - 250
- 251 - 500
- 501 - 1000
- 1001 - 1500
- > 1500

* Groundwater Production Data Source:
Western-San Bernardino Watermaster, 2010

Some locations approximate

N W E S

0 0.5 1 2 Miles

WESTERN MUNICIPAL WATER DISTRICT

Groundwater Production, Average for 2005 to 2009

Arlington Basin Groundwater Management Plan

2010

Figure 3.10

3.3 PROJECTED WATER REQUIREMENTS AND SUPPLIES

As discussed in Section 3.2, the primary users of Plan Area groundwater are private groundwater producers and Western through its Arlington Desalter. Corona does not anticipate producing groundwater from the Plan Area within their planning horizon (Todd Engineers, 2008).

No estimates of future groundwater production by private groundwater producers are available; however, historical trends seen on Figure 3.6 suggest that the current volumes of groundwater production are likely to continue at a similar level into the future.

Western is in the planning phases for an expansion of the Arlington Desalter by increasing the treatment capacity from 6.3 mgd up to 10 mgd. This would allow the Arlington Desalter to supply more water for Western's service area. The project will likely be combined with artificial recharge of recycled and/ or storm water through ongoing cooperation with the RCFCWCD.

Figure 3.11 illustrates total water currently served (within and outside the Plan Area) as well as projections to 2030 by the primary retail water agency in the Plan Area, RPU. Private groundwater pumpers are also included with the assumption of a continuation of recent (2005 through 2009) levels of production. The water served by the retail water agencies includes groundwater from other basins as well as imported water and recycled water for users both within and outside of the Plan Area. For instance, while 2009 supplies for RPU were approximately 85,000 AF (as shown on Figure 3.11) only approximately one quarter of this amount was used within the Arlington Basin (RPU, pers. comm., December 3, 2009) and none of this water was produced from the Arlington Basin. It is important to look at the total supply for the agency rather than only the portion within the Plan Area. The Plan Area functions within a regional context where growth outside of the basin impacts the total water demand and changes in supplies outside the basin impact water availability in the basin; both changes in demand and changes in supply impact the demands placed on Plan Area groundwater. These changes in supplies and demands are best analyzed at the agency level, as the agencies provide a blended water supply throughout their service area.

Tables 3.2a and 3.2b present the projected Plan Area groundwater production and groundwater recharge, respectively.

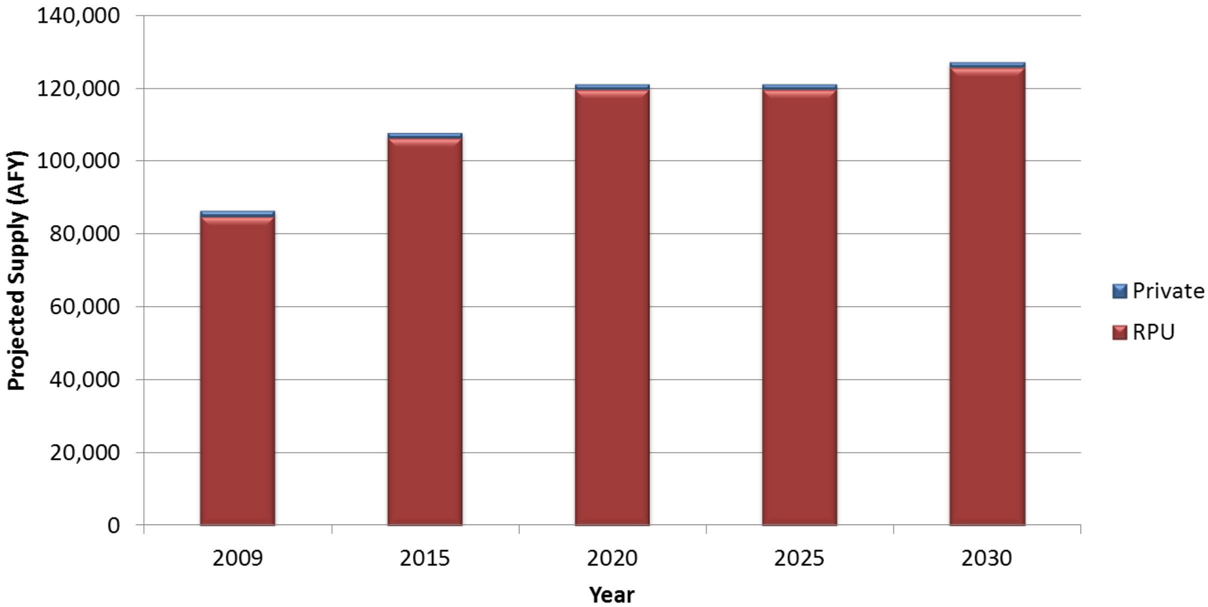


Figure 3.11 Projected Water Supplies for Agencies Wholly or Partially Overlying the Plan Area, by Agency

Table 3.2a Projected Plan Area Groundwater Production (AFY)

Agency	2009	2015	2020	2025	2030
RPU	0	0	0	0	0
Western – Arlington Desalter	6,935	8,250	12,000*	12,000*	12,000*
Private	1,668	1,500	1,500	1,500	1,500
Total Groundwater Pumping	**8,603**	**9,750**	**13,500**	**13,500**	**13,500**

* Projected Western-Arlington Desalter production is the maximum currently anticipated. This value may be lower in the future due to a variety of factors involved in expanding this facility.

Sources: RPU, pers. comm., July 22, 2009; Western, pers. comm., July 1, 2009; Western, 2008b; Valley District and Western, 2010.

Table 3.2b Projected Plan Area Artificial Groundwater Recharge (AFY)

	2009	2015	2020	2025	2030
Groundwater Recharge	0	400*	4,000*	4,000*	4,000*

*Values are based on current understanding of basin conditions and desalter production.

Source: Western, pers. comm., February 8, 2011.

The projected Plan Area groundwater supplies are shown on Figure 3.12 with the historical production discussed in Section 3.1. Figure 3.13 shows projected agency demand by supply type for RPU and private producers. Projected supplies for RPU include supplies for use throughout its full service areas, including areas outside the Plan Area.

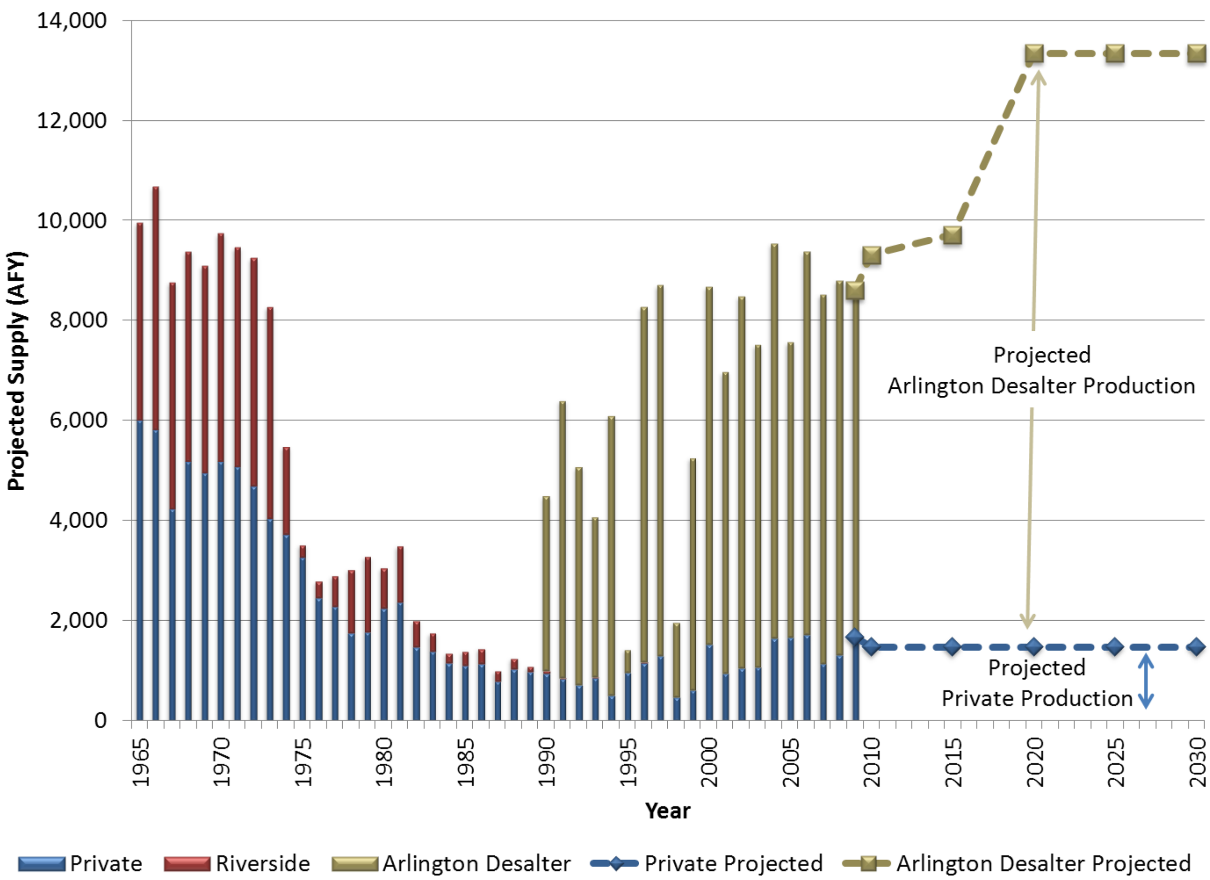


Figure 3.12 Historical and Projected Groundwater Production for the Plan Area

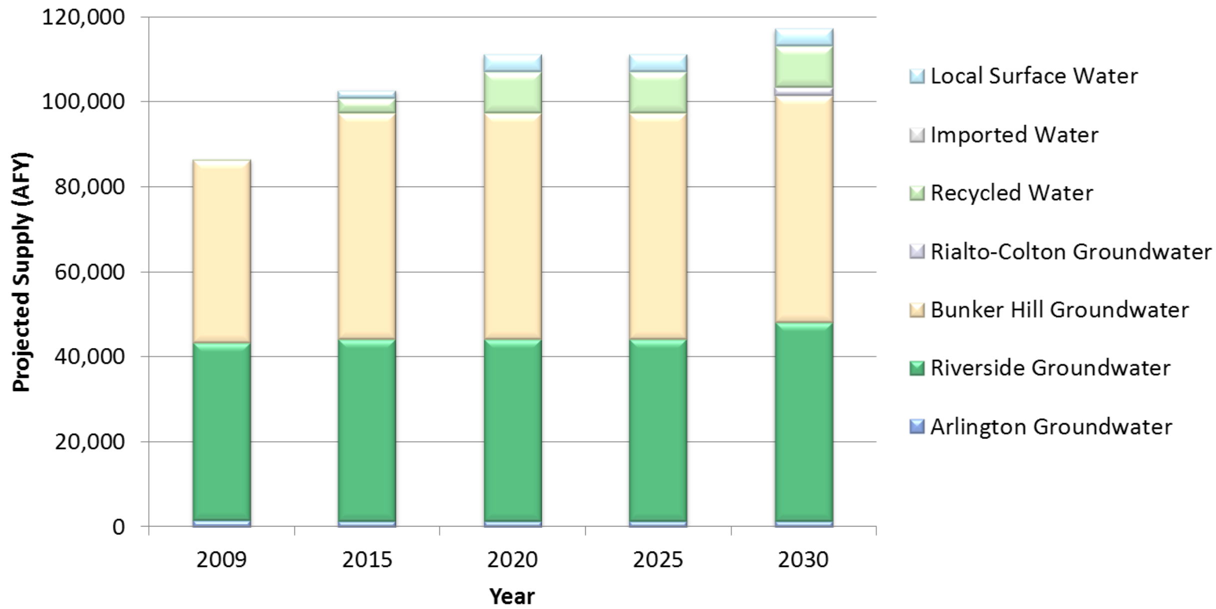


Figure 3.13 Projected Water Supplies for Agencies Wholly or Partially Overlying the Plan Area, by Supply Type

Details of the water supply projections for RPU, the Arlington Desalter, and the private pumpers are provided in the following sections. The projections are for supplies for the entire agency, not solely the portion within the Plan Area. RPU's service area is 27% within the Plan Area.

3.3.1 RIVERSIDE PUBLIC UTILITIES

Water supplies for RPU are projected to increase from 93,500 AF currently to 125,750 AF in 2030 (RPU, pers. comm., October 8, 2009; RPU, 2009), as shown on Figure 3.14 Supplies met by conservation, 10,000 AFY by 2030, are not shown in the chart. Additional new sources of water to meet future needs are the following:

- 10,000 AFY of water conservation, including toilet retrofits, weather-based irrigation controllers, and turf replacement programs. 5,000 AFY of conservation is expected to be in place by 2015.
- Expansion of the recycled water system to provide 9,700 AFY of recycled water, with a first phase providing 3,400 AFY of recycled water by 2015.
- Substitution of 4,000 AFY of non-potable groundwater to the Upper Gage Canal at UC Riverside, freeing up 4,000 AFY of potable groundwater by 2015.

- Increase in production from Riverside Basin of approximately 14,400 AFY, including operation of recharge basins along the Santa Ana River in Riverside North to increase overall basin yield.
- Decrease in production from Bunker Hill Basin by approximately 6,200 AFY
- Full participation in the Seven Oaks Dam conservation project, resulting in an additional 4,000 AFY of groundwater production, on average.
- Development of a well in the Colton Basin to provide 2,000 AFY of supply (CDM, 2009).
- No usage of Arlington groundwater is currently projected for RPU.

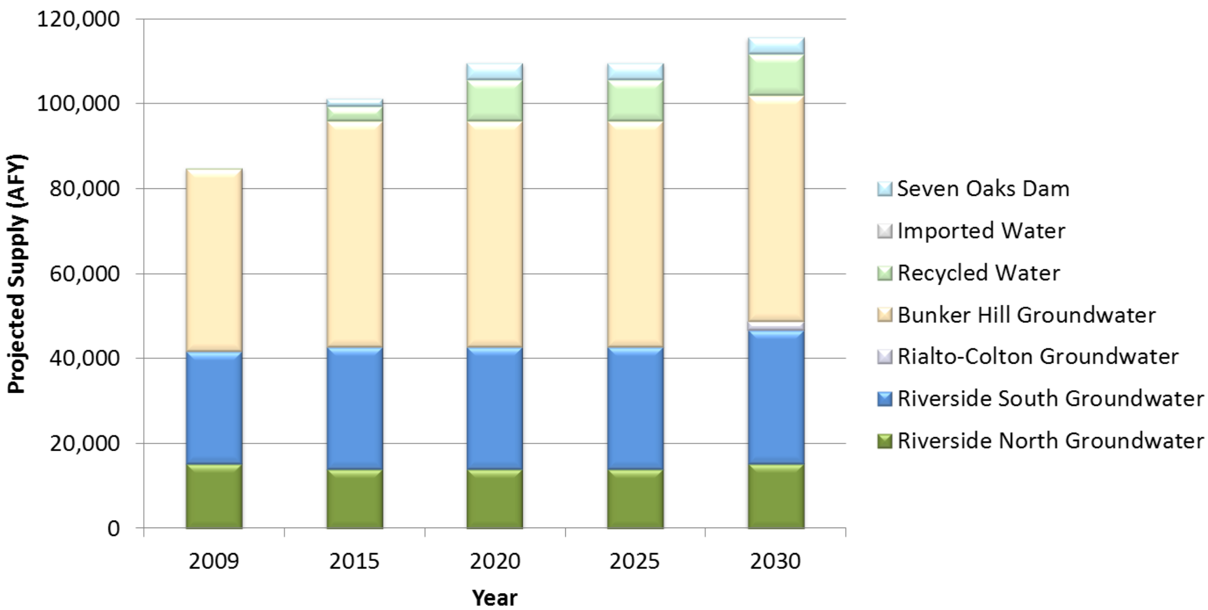


Figure 3.14 Projected Water Supply for RPU

3.3.2 Western – Arlington Desalter

Western is in the planning phases for an expansion of the Arlington Desalter by increasing the product water from 6.3 mgd to up to 10.0 mgd. This would allow the Arlington Desalter to supply more water for Western's service area. By 2020, the Arlington Desalter is projected to be pumping 11,872 AFY of groundwater from the Plan Area (Western, 2009b).

The project may be combined with artificial recharge of recycled, storm water, and dry weather water through ongoing cooperation with the RCFCWCD. This is projected to result in the recharge of 4,000 AFY of water to the groundwater basin by 2020 (Western, 2009b).

3.3.3 PRIVATE GROUNDWATER PRODUCERS

No projections of private groundwater use are available. Historical trends, shown on Figure 3.6, indicate a demand of 1,501 AFY over the past 5 years. Future use is assumed to continue at this level through 2030.

4 LONG-TERM BASIN YIELD

4.1 LONG-TERM BASIN YIELD DEFINITION

The long-term basin yield of the Arlington Basin was estimated using the calibrated numerical groundwater model of the Riverside and Arlington Basins: RAGFM. The usage of RAGFM in this analysis is documented in *Riverside-Arlington Groundwater Flow Model (RAGFM), Model Development and Scenarios* (WRIME, 2011a). Long-term basin yield was estimated by RAGFM, utilizing:

- **A sufficiently long simulation period to represent or approximate long-time mean climatological conditions**: The modeling analysis includes a 43-year hydrologic period (1965-2007) that includes wet, dry, and normal periods and is considered representative of long-term mean climatological conditions
- **A given pattern of extractions:** The modeling analysis utilizes the current level of extractions as represented by 2007 production data
- **A particular set of physical conditions or structures as such affect the net recharge of the groundwater body:** The modeling analysis utilizes 2007 land use and water use conditions and includes Western's Arlington Desalter
- **A given amount of usable underground storage capacity**: The model identifies usable storage capacity through the physical bedrock representation and the incorporation of the depth and screened intervals of wells

4.2 WATER BUDGET

The yield analysis is based on a water budget that provides information on the components of inflow and outflow in a groundwater basin and the resulting change in storage. While dependent on climatic variability and other factors, such information can show the major sources of inflow and outflow and provide information on the sustainability of water use in a basin. A water budget study of the Plan Area was performed as part of the yield analysis and is included as *Riverside-Arlington Groundwater Flow Model (RAGFM): Model Development and Scenarios* (WRIME, 2011a). The analysis was based on a water budget. The simplified version of the water budget equation for a basin is:

$$\textbf{Inflow} - \textbf{Outflow} = \pm\textbf{Storage Change} \qquad \textbf{(1)}$$

Storage Change may be positive or negative, depending on the magnitude of Inflow and Outflow. Inflow, Outflow, and Storage Change consist of the following more detailed subcomponents :

- Inflow

  - Applied water components
    - Agricultural water use
    - Landscape and outdoor irrigation
    - Leakage from water and sewer systems
  - Recharge from direct precipitation
  - Recharge from water courses
  - Boundary flow
  - Underflow from Temescal Basin
  - Underflow from Riverside South
- Outflow
  - Groundwater production, including desalter production
  - Underflow to Temescal Basin (through the Arlington Gap)
  - Evapotranspiration
  - Discharge to surface drainage
  - Underflow to Riverside South
- Groundwater storage change

Groundwater storage change was developed based on changes in water levels and corresponding changes in saturated volumes in the aquifer over time. A detailed description of the methodology for developing the storage change value and values for other major components of the water budget are included in WRIME (2011a).

The average annual water budget for the modeled Existing Conditions Baseline for the Plan Area is presented in Table 4.1.

Table 4.1
Average Annual Plan Area Water Balance for Modeled Existing Conditions Baseline

Water Budget Component	Average Annual Volume (AFY)
Groundwater production (private producers)	1,150
Desalter production*	5,180
Underflow to Temescal Basin	0
Underflow and surface discharge to Hole Lake area	160
Underflow to Riverside South	570
Total Outflow	***7,060***
Recharge from applied water and precipitation	890
Boundary flow and recharge from other watercourses	4,400
Underflow from Temescal Basin	920
Underflow from Riverside South	470
Total Inflow	***6,690***
Change in Storage	***-370***

Sources and methods are presented in *Riverside-Arlington Groundwater Flow Model (RAGFM): Model Development and Scenarios (*WRIME, 2011a).
*Desalter production reduced by 70% from 2007 conditions as 2007 production resulted in some modeled wells going dry.

The simulated recharge amount is lower than the estimate of Arlington Basin recharge performed in an earlier study (Wildermuth, 2007), which estimated recharge as 8,500 AFY for the year 2004.

4.3 LONG-TERM BASIN YIELD ESTIMATE

The long-term basin yield results of *Riverside-Arlington Groundwater Flow Model (RAGFM): Model Development and Scenarios* and their relation to basin production are shown in Tables 4.2 and 4.3. The long-term basin yield was estimated from the average annual groundwater production plus the average annual change in storage.

Table 4.2
2009 Groundwater Production and Long-Term Basin Yield Estimate (AFY)

2009 Production*	Long-Term Basin Yield	Overdraft
8,600	6,000	2,600

*Production includes desalter wells

Table 4.3
Projected 2030 Groundwater Production and Long-Term Basin Yield Estimate (AFY)

Projected 2030 Production*	Long-Term Basin Yield	Projected 2030 Artificial Recharge	Projected Overdraft
13,500	6,000	4,000	3,500**

*Production includes desalter wells. As noted in Table 3.2a, the projected desalter production is the maximum currently anticipated. This value may be lower in the future due to a variety of factors involved in expanding this facility.

** Projected overdraft is estimated by the amount that Projected 2030 Production minus Projected 2030 Artificial Recharge exceeds the Long-term basin yield. All three of these values are subject to uncertainty.

Tables 4.2 and 4.3 show that current and future production exceed the estimated long-term basin yield. A portion of the projected production increase will be offset by projected new artificial recharge.

The understanding of the relationship between long-term basin yield and 2009 and projected production is a key element in maintaining and developing efficient management policies among stakeholders in the Arlington Basin. Groundwater management objectives, elements, and implementation are based on these values and are discussed in detail in Sections 5, 6, and 7 of this document.

5.1 GOAL

The goal of the GWMP is to operate the groundwater basin in a sustainable manner for reliable supply for beneficial uses.

Sustainable is defined as being able to continue groundwater production in the future with a similar real cost, quantity, and end-user quality as today. Beneficial uses include water supplies for municipal use, agricultural use, private wells, environmental purposes, and downstream users.

Four BMOs are defined below to support this goal. In turn, elements are presented in Section 6, Elements of the GWMP, and implementation is presented in Section 7, Implementation, to support the objectives and elements. Together these function as the overall groundwater strategy for the basin.

5.2 BASIN MANAGEMENT OBJECTIVE COMPONENTS

Basin management objectives are adaptable, quantifiable objectives with prescribed monitoring and defined reporting and responses. BMOs are defined through:

- Management areas and sub-areas
- Public input
- Monitoring
- Adaptive management
- Enforcement

5.2.1 MANAGEMENT AREAS AND SUB-AREAS

The management area is the entire Plan Area for most BMOs. Sub-areas are not used in these BMOs, as there are no easily delineable areas with significantly different hydrogeologic conditions. The only BMO that uses sub-areas is the BMO to Maintain or Improve Groundwater Quality, which incorporates the Management Zones defined by the RWQCB's Basin Plan (see Figure 1.7).

5.2.2 PUBLIC INPUT

Public input is important in establishing BMOs. Local knowledge is needed to develop appropriate objectives and local acceptance is necessary to ensure implementation. Public input for the BMOs was gathered through Advisory Committee meetings and public meetings, as described in Sections 1.7 and 0.

5.2.3 MONITORING

Accurate, consistent, and accepted monitoring procedures are necessary to implement the quantitative BMOs. This monitoring will document whether objectives are being met and will trigger actions if defined thresholds are exceeded. The monitoring protocol must allow for quick and easy sharing of data among all stakeholders to gain acceptability and to allow for action, if needed, in a timely fashion. Monitoring is described under each BMO and in Appendix D.

5.2.4 ADAPTIVE MANAGEMENT

Every year brings new data and new conditions to the Arlington Basin. The BMOs are intended to be flexible, allowing for change due to changes in basin operations and in understanding of the groundwater basin characteristics. Adjustments to BMOs are discussed in Section 6.4.5, Reporting and Updating.

5.2.5 ENFORCEMENT

In its current form, the GWMP does not have enforcement mechanisms for the BMOs. The BMOs are guidelines to be monitored and reported for the benefit of all basin users. As the BMOs are defined to meet a common goal, it is intended that enforcement will not be necessary. However, future plan revisions may implement enforcement mechanisms if deemed necessary by the stakeholders in the basin.

5.3 BASIN MANAGEMENT OBJECTIVES

The BMOs include definitions of acceptable groundwater levels, groundwater quality, inelastic land subsidence, and groundwater/ surface water interaction within the Plan Area, along with actions to be taken when defined thresholds are met.

5.3.1 MAINTAIN ACCEPTABLE GROUNDWATER LEVELS

Management of groundwater levels in the Arlington Basin is important to ensure a long-term sustainable supply. Key components of the water level strategy include maintaining adequate groundwater in storage to ensure that the ability of existing infrastructure to produce groundwater is not impacted by declining groundwater levels; and controlling migration of Arlington Basin groundwater, which is typically of lower quality than surrounding basins with respect to regional non-point source contaminants.

Groundwater level monitoring, thresholds, and actions are defined below. Monitoring includes groundwater level measurements within a month of November 15 of each year from three identified wells. The three well measurements are compared to the thresholds defined below:

- Threshold 1: Groundwater elevations are below the historical low groundwater elevation.
- Threshold 2: Groundwater elevations are 10 feet below the historical low groundwater elevation.

If Threshold 1 is violated for all or some of the wells, the Advisory Committee will meet to discuss the situation, including an analysis of trends, potential impacts to groundwater users or the environment, and the most appropriate actions, both immediate and upon Threshold 2 (if met). Actions will be based on the plan elements defined in Section 6, Elements of the Groundwater Management Plan, and the projects defined in Section 7, Implementation of the Groundwater Management Plan. These actions may include:

- Continued operation
- Conservation measures
- Increased monitoring
- Decreased production
- Accelerated development of recharge projects
- Substitution of alternate supplies
- Reoperation of existing wells or construction of new wells to move production to other parts of the basin

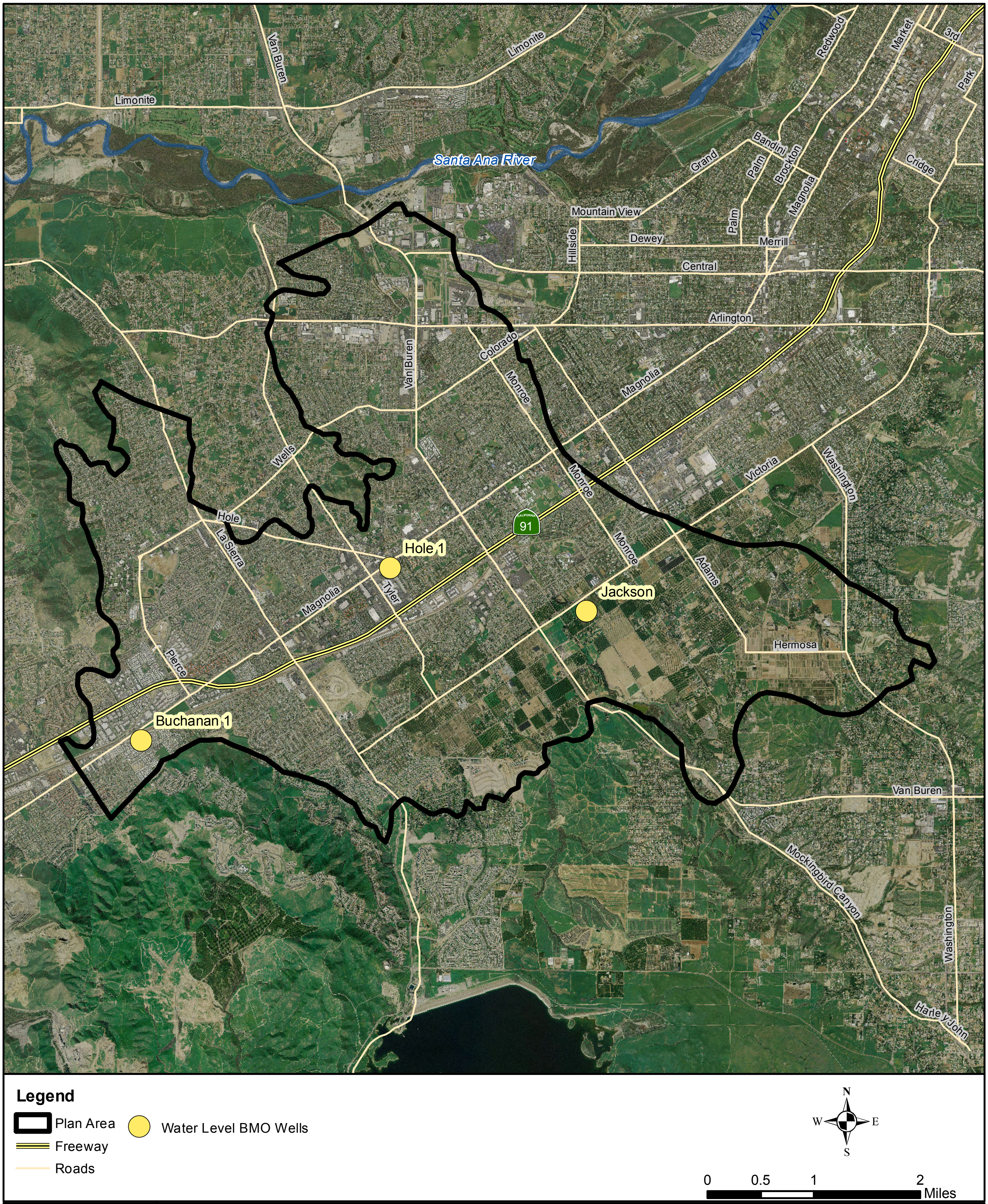
If Threshold 2 is violated, the actions defined for Threshold 1, and any additional measures deemed necessary by the Advisory Committee, will be implemented.

Groundwater level BMO thresholds are shown in Table 5.1 for the wells shown on Figure 5.1 based on the hydrographs included on Figure 5.2. Efforts should be made to get formal access agreements put into place. If the ability to monitor the well over a long-term period is deemed questionable, an alternate well should be used for BMO monitoring.

Table 5.1 Groundwater Level BMO Thresholds

Well	8/2010 Levels (feet msl)	Threshold 1 (feet msl)	Threshold 2 (feet msl)
Buchanan #1 & #2	637.35	635	625
Hole #1	705.49	700	690
Jackson	814.47	805	795

msl = mean sea level



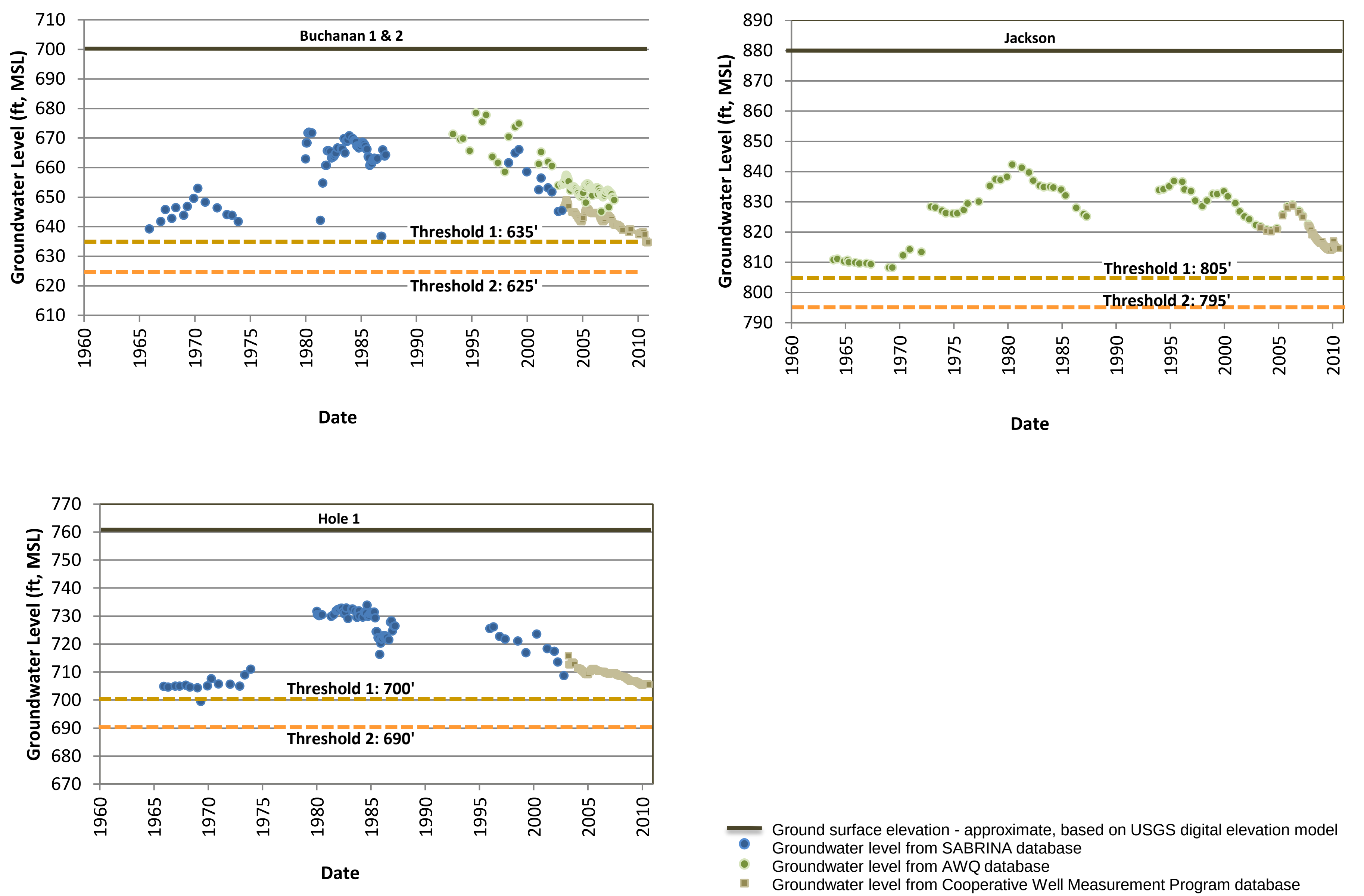
WESTERN MUNICIPAL WATER DISTRICT

Wells Monitored for Water Level BMOs

Arlington Basin Groundwater Management Plan

2010

Figure 5.1



WESTERN MUNICIPAL WATER DISTRICT

Water Level BMO Hydrographs

Arlington Basin Groundwater Management Plan

2010

Figure 5.2

5.3.2 Maintain or Improve Groundwater Quality

The RWQCB has defined water quality objectives through the Basin Plan (see Section 1.6.3) for the Plan Area based on nitrate as N and TDS concentrations. The GWMP will work within this framework to meet the Basin Plan objectives, including recognition of Management Zones as defined in the Basin Plan (see Figure 1.7). Efforts will also be made to ensure that sufficient, high quality data are collected for future analyses of compliance with Basin Plan objectives.

Water quality thresholds are defined as the following:

- Threshold 1: Average nitrate as N or TDS, as computed by the RWQCB, is 90% of the management objective.
- Threshold 2: Average nitrate or TDS, as computed by the RWQCB, exceeds the management objective.

Data developed in regular reports by the Basin Monitoring Program Task Force and the RWQCB (e.g., *Recomputation of Ambient Water Quality in the Santa Ana River Watershed for the Period 1987 to 2006*) will be compared to these thresholds.

If Threshold 1 is violated, the Advisory Committee will meet to discuss the situation, including an analysis of trends, potential impacts to groundwater users or the environment, and the most appropriate actions, both immediate and in the event that Threshold 2 levels are met. Actions will be based on the plan elements defined in Section 6, Elements of the Groundwater Management Plan, and the projects defined in Section 7.1, Potential Opportunities. These actions may include:

- Continued operation
- Increased monitoring
- Studies of sources of contamination and additional options to manage water quality
- Altered desalter operation
- Altered operation of recharge basins
- Reoperation or new wells to move production to other parts of the basin or different depths
- Substitution of alternate supplies

If Threshold 2 is violated, the actions defined for Threshold 1 and any additional measures deemed necessary by the Advisory Committee may be implemented.

Groundwater quality BMO thresholds are shown in Table 5.2.

Table 5.2 Groundwater Quality BMO Thresholds

Sub-area	Nitrate as N Thresholds		TDS Thresholds		Current (2006) Status
	Threshold 1	Threshold 2	Threshold 1	Threshold 2	
Arlington	9.0	10.0	880	980	Nitrate Threshold 2 exceeded TDS Threshold 1 exceeded
Riverside-D	9.0	10.0	730	810	Insufficient data

5.3.3 IMPLEMENT LAND SUBSIDENCE MONITORING

The land subsidence BMO focuses on increased understanding of the problem through additional monitoring activities. Additional surveys by spirit-leveling or using Global Positioning Satellites (GPS), Satellite Interferometric Synthetic Aperture Radar (InSAR) analysis, and/ or extensometers could better define the extent of subsidence within the Arlington Basin. Currently, the understanding of the problem is limited, as studies have not been performed due to the absence of reported damage from subsidence. As monitoring becomes sufficiently cost-effective given the current understanding of subsidence risks in the basin, new monitoring may be established and a quantitative BMO may be established under the reporting and updating element contained in Section 6.4.5, Reporting and Updating. A benefit of InSAR analysis is its ability to use historical imagery to estimate subsidence, limiting the need for establishment of baseline conditions.

Actions will be based on the plan elements defined in Section 6, Elements of the Groundwater Management Plan, notably Section 6.3.4, Inelastic Land Subsidence.

5.3.4 MANAGE THE INTERACTION OF SURFACE WATER AND GROUNDWATER FOR THE MAINTENANCE OF GROUNDWATER AND SURFACE WATER QUANTITY AND QUALITY

This BMO seeks to manage changes in surface water flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping in the basin. As discussed in Section 2.3.8, while groundwater and surface water in the Arlington Basin are linked, there are no major watercourses in the basin.

No quantitative thresholds are set for this BMO, however, a qualitative objective of maintaining or improving the interaction of surface water and groundwater is as follows:

- Water quality in the small watercourses entering the basin will be maintained at a level to support the beneficial uses of groundwater in the basin, as the watercourses are a source of recharge to the basin.

- Groundwater levels and quality will be maintained at a level to support the beneficial uses of the Santa Ana River, as groundwater discharges to the Hole Lake area, eventually feeding the Santa Ana.

6 ELEMENTS OF THE GROUNDWATER MANAGEMENT PLAN

The Elements of the GWMP provide actions that, when implemented, are intended to meet the defined objectives and goals. California Water Code section 10753.8 states that a GWMP may include components relating to all of the following:

- Control of saline water intrusion
- Identification and management of wellhead protection areas and recharge areas
- Regulation of migration of contaminated groundwater
- Administration of a well abandonment and well destruction program
- Mitigation of overdraft conditions
- Replenishment of groundwater extracted by water producers
- Monitoring of groundwater levels and storage
- Facilitation of conjunctive use operations
- Identification of well construction policies
- Construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects
- Development of relationships with state and federal regulatory agencies
- Review of land use plans and coordination with land use planning agencies to assess activities that create a reasonable risk of groundwater contamination

Additionally, as described in Section 1.9, there are numerous recommended items to include in GWMPs. These include the following:

- The monitoring and management of groundwater levels, groundwater quality, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping
- A plan to involve other agencies that enables the local agency to work cooperatively with other public entities whose service areas or boundaries overlie the groundwater basin
- Public outreach and stakeholder involvement

These elements are grouped into broad categories on Figure 6.1 and in Table 6.1 to show how the elements interact to allow the Arlington Basin to move toward meeting the goal of operating the groundwater basin in a sustainable manner for reliable supply for beneficial uses. Elements and actions defined under the Groundwater Volume, Groundwater Quality, and Surface Water/ Groundwater Interaction categories all pass through a monitoring element which allows for policy decisions based on reporting, coordination, and stakeholder involvement. Table 6.1 relates the individual elements to the categories and to the objectives. The remainder of this section addresses each element, including actions.

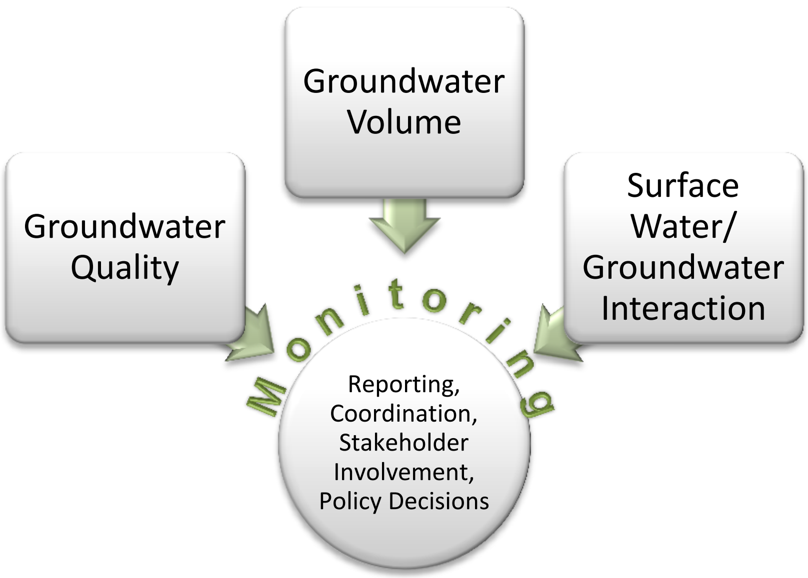


Figure 6.1 Interaction of Elements

Table 6.1
Summary of GWMP Objectives and Elements

Item	BMOs: Maintain Acceptable Groundwater Levels	BMOs: Maintain or Improve Groundwater Quality	BMOs: Implement Land Subsidence Monitoring	BMOs: Manage Interaction of Surface Water And Groundwater
Groundwater Volume				
Mitigation of overdraft conditions	✓	✓		✓
Replenishment of groundwater extracted by water producers	✓	✓		✓
Facilitation of conjunctive use operations	✓	✓		✓
Groundwater Quality				
Control of saline water intrusion		✓		✓
Identification and management of wellhead protection areas and recharge areas	✓	✓		✓
Regulation of migration of contaminated groundwater		✓		✓
Administration of a well abandonment and well destruction program		✓		✓
Identification of well construction policies		✓		✓
Construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects	✓	✓		✓
Monitoring				
Monitoring of groundwater levels and storage	✓			✓
Monitoring of groundwater quality		✓		✓
Monitoring of surface water/ groundwater interaction	✓	✓		✓
Monitoring of inelastic land subsidence			✓	
Reporting, Coordination, Stakeholder Involvement, Policy Decisions				
Stakeholder involvement	✓	✓	✓	✓
Development of relationships with state and federal regulatory agencies	✓	✓	✓	✓
Coordination with IRWMP efforts	✓	✓	✓	✓
Review of land use plans and coordination with land use planning agencies to assess activities that create a reasonable risk of groundwater contamination	✓	✓		✓
Reporting and updating	✓	✓	✓	✓

6.1 GROUNDWATER VOLUME

6.1.1 MITIGATION OF OVERDRAFT CONDITIONS

The long-term basin yield of the Arlington Basin, as described in Section 4, is estimated at 6,000 AFY. 2009 groundwater production in the Arlington Basin is reported at approximately 8,600 AF, therefore the Arlington Basin is in an overdraft condition by approximately 2,600 AFY. By 2030, production is estimated to increase up to 4,700 AFY, partially balanced by a projected 4,000 AFY of artificial recharge by 2030. The overdraft condition is thus projected to be up to 3,300 AFY by 2030.

Overdraft conditions can be addressed through reduced pumping or increased recharge. Such programs are best undertaken on a regional scale, to share costs and benefits in a cooperative, voluntary manner. Groundwater recharge projects (such as those briefly described in Section 7.1) utilizing storm water to replenish the basin will be critical in reducing the effects of overdraft. Imported or recycled water may also be a source for future direct or in-lieu recharge projects. The groundwater recharge projects described in Section 7, Implementation (specifically the Arlington Basin Recharge Facilities), are essential components in meeting projected demands in the Arlington Basin.

Managing the volume pumped from the aquifer can also mitigate overdraft. The historical data and projected estimates of groundwater production can form the basis for cooperative agreements between willing participants on future pumping.

Actions

A1. *Complete modeling activities and meet with stakeholders to discuss the results and determine the ability of the basin to meet projected groundwater demands.*

A2. *With willing participants, develop equitable methods to manage future basin-wide groundwater production, through development of alternate supplies, limits, fees, incentives, or other means.*

A3. *With willing participants, develop equitable methods to fund and construct recharge facilities or projects to enhance recharge.*

A4. *Encourage the use of shallow groundwater, where present, by pumping for irrigation and other non-potable uses, while avoiding negative impacts to surface water resources.*

6.1.2 REPLENISHMENT OF GROUNDWATER EXTRACTED BY WATER PRODUCERS

Groundwater replenishment will take place to increase stored water in the aquifer for normal and drought periods. Replenishment will occur on a voluntary basis as economically feasible project locations and water sources become available. Replenishment must be considered by entities wishing to increase groundwater production within the basin.

Actions

B1. *Implement direct recharge of recycled water, storm water, imported water, and other surface water.*

B2. *Substitute other water supplies such as water from desalters, imported water, and recycled water for groundwater.*

B3. *Implement conservation efforts.*

B4. *Select recharge water to best manage the quality of both the recharge water and the quality of the receiving waters.*

B5. *Consider a replenishment fee on a per acre-foot basis above a baseline production amount, or other method, to fund regional replenishment activities.*

6.1.3 FACILITATION OF CONJUNCTIVE USE OPERATIONS

Conjunctive use operations can assist in optimizing the usage of diverse water supplies, assisting in meeting BMOs over the long term. Conjunctive use in the Arlington Basin may take the form of direct recharge through spreading basins near sources of water and near high permeability soils, such as within the B soils noted on Figure 2.4. Conjunctive use could also take the form of in-lieu recharge, in which other supply sources, such as imported water or recycled water, may replace groundwater during winter or wet years, allowing groundwater pumping during times of reduced imported water supplies.

Actions

C1. *Develop, implement, and maintain programs and projects to recharge aquifers and to implement conjunctive use. Programs may be local or regional in scope and will be designed to not have an adverse impact on groundwater quality.*

6.2 GROUNDWATER QUALITY

6.2.1 CONTROL OF SALINE WATER INTRUSION

The Arlington Basin has higher TDS than the neighboring Temescal or Riverside Basins (Wildermuth, 2008b). Control of saline water intrusion in this situation involves the management of the groundwater basin in a manner to minimize potential impacts to surrounding basins. By reducing groundwater levels within the Arlington Basin, subsurface outflows into basins with higher quality groundwater is reduced. Further, the Arlington Desalter removes salts from the water before delivery and the brines are disposed of outside of the basin. Removal of salts may improve groundwater quality, depending on the quality of water recharged naturally and artificially to the basin. Continued control of saline water involves management of groundwater levels and operation of the desalters.

Actions

D1. *Operate desalters to remove salts from the aquifer and to maintain water levels at a level low enough to minimize migration of lower quality Arlington Basin groundwater into surrounding basins or the migration of higher quality water into the Arlington Basin. Such operation may require expansion of the existing system. Utilize groundwater models to optimize operations.*

6.2.2 IDENTIFICATION AND MANAGEMENT OF WELLHEAD PROTECTION AREAS AND RECHARGE AREAS

The entire Arlington Basin is a recharge source and requires protection to ensure both high quality recharge as well as to maintain or enhance existing recharge quantities. Boundary flow from the surrounding mountains and recharge from small watercourses are the most important recharge sources in the basin, as discussed in Section 4.2. The ability of these waters to enter the basin and percolate to the aquifer should be maintained or enhanced. The highest priority for recharge preservation is areas with soils conducive to recharge with specific attention to the benefit of unlined channels. Figure 2.4 shows areas identified as Hydrologic Soils Group A. This group has the highest tendency to allow water to soak into the ground rather than run off. Soils classified as B have a lower tendency to allow water to soak into the ground, but are still good areas for recharge compared to C and D soils. Areas covered by these A and B soils are relatively important for recharge quantity and are also points of vulnerability for contaminants to enter the groundwater aquifer.

No drinking water source assessments have been produced by the groundwater agencies for wells in the Arlington Basin. Identification of uses threatening groundwater quality in the Arlington Basin is important to protect the future water quality of the basin. Land use decisions should consider potential long-term groundwater quality, while recognizing that water produced from the Arlington Basin is used for non-potable uses or is extensively treated through the desalters.

Actions

E1. *Preserve and protect aquifer recharge areas, especially soil types A and B.*

E2. *Implement public outreach efforts for recharge areas, storm water management, and dumping.*

E3. *Design recharge facilities to minimize pollutant discharge into storm drainage systems, natural drainage, and aquifers.*

E4. *Decrease storm water runoff, where feasible, by reducing paving in development areas, and by using design practices such as permeable parking bays and porous parking lots with bermed storage areas for rainwater detention. Exercise caution to avoid contamination from oil, gasoline, and other surface chemicals.*

E5. *Manage streams with natural approaches, to the maximum extent possible, where groundwater recharge is likely to occur.*

E6. *Consider offering incentives to landowners to limit their ability to develop their property to maintain or enhance its retention as a natural groundwater recharge area. These incentives will encourage the preservation of natural water courses without creating undue hardship on the property owners, and might include density transfers.*

E7. *Participate in SAWPA's emerging constituents workgroup.*

6.2.3 REGULATION OF THE MIGRATION OF CONTAMINATED GROUNDWATER

Regulating contaminated groundwater migration is important for both protecting existing sources of groundwater and for developing new sources of groundwater. Coordination with regulatory agencies, neighboring agencies and municipalities, and potentially responsible parties will give water managers input into the cleanup and containment of contaminated sites and will improve long-term planning efforts based on the predicted impact of those hazards. Additionally, new, improved, and more cost-effective treatment technologies can potentially result in additional potable or non-potable supplies from groundwater that was previously considered unavailable for use, including brine concentration treatment.

Actions

F1. *Coordinate with local regulatory agencies to share information about contaminated sites and about the basin groundwater system and wells.*

F2. *Develop a regional groundwater quality model to improve the ability to analyze the quality impacts of management decisions.*

6.2.4 ADMINISTRATION OF A WELL ABANDONMENT AND WELL DESTRUCTION PROGRAM

Abandoned or poorly constructed wells should be properly destroyed to prevent migration of surface contaminants down well bores to the aquifer or across clay layers within the aquifer. Well destruction in the basin is administered by Riverside County Community Health Agency's Department of Environmental Health (DEH). Well destruction is performed in accordance with procedures set forth in DWR's *California Well Standards*, Bulletin 74-90 (1990).

Actions

G1. *Survey abandoned wells in the basin both physically and from county records. Utilize historical extraction records to identify potential abandoned wells.*

G2. *Coordinate with DEH on destruction standards and procedures, as well as on logging of status of abandoned and destroyed wells.*

6.2.5 IDENTIFICATION OF WELL CONSTRUCTION POLICIES

Well construction in the basin is administered by DEH. The DEH issues permits for the construction and/ or abandonment of all water wells including, but not limited to, driven wells, monitoring wells, cathodic wells, extraction wells, agricultural wells, and community water supply wells. The wells are inspected during different stages of construction to help verify standards are being met. All drinking water wells are evaluated once installation is complete to ensure compliance with California Well Standards set forth in DWR's *California Well Standards*, Bulletin 74-90 (1990) and minimum drinking water standards.

Actions

H1. *Coordinate with DEH staff to ensure that all are aware of local and regional contamination plumes. Increased restrictions on well construction may be necessary near these plumes.*

6.2.6 CONSTRUCTION AND OPERATION BY THE LOCAL AGENCY OF GROUNDWATER CONTAMINATION CLEANUP, RECHARGE, STORAGE, CONSERVATION, WATER RECYCLING, AND EXTRACTION PROJECTS

Properly designed, constructed, and operated projects can cost effectively move the basin towards meeting water quantity, water quality, and subsidence objectives. These projects will include:

- Groundwater contamination cleanup

Actions: ***I1.*** *Cost-effectively clean up or contain point-source (e.g., leaking underground tanks) and non-point-source (e.g., nitrate and TDS) contamination in the groundwater basin. Point-source cleanup activities will include interfacing with regulatory agencies, potentially responsible parties, and other nearby agencies and municipalities. These actions will seek to return the contaminated area, to the extent possible, to a water supply source. Cleanup activities will be performed by the potentially responsible parties, and the regulatory agencies. Payment for impacts to the water system will be sought from the potentially responsible parties. Non-point source contamination cleanup will include the operation of desalter wells, as previously discussed in Section 6.2.1, Control of saline water intrusion.*

- Recharge

Actions: ***I2.*** *Construct and operate* projects *to recharge acceptable-quality surplus water to the groundwater basin. Recharge water may include storm water, surface water, recycled water, or imported water. Recharge water will be selected to mutually benefit groundwater quantity and groundwater quality. Recharged water will be captured through existing pumping facilities. It is not anticipated that additional facilities will be needed to extract stored water.*

- Storage – Additional surface storage, while beneficial, is not anticipated in the area beyond small scale water harvesting and detention basins.
- Conservation – Conservation is a key part of water demand management in the basin. RPU and Western are signatories to the MOU of the California Urban Water Conservation Council and participate in demand-side management measures. These agencies have committed to implement best management practices to reduce water demand. Basin agencies also participate in Metropolitan's "Save Water – Save a Buck"

water conservation incentive program. Western has been especially active in developing outreach for water-efficient landscapes.

Actions

I3. *Participate in the programs of the California Urban Water Conservation Council.*

I4. *Encourage installation of water-conserving systems such as dry wells and gray water systems where feasible, especially in new developments. Also encourage installation of cisterns or infiltrators to capture rainwater from roofs for irrigation in the dry season and flood control during heavy storms. Include education programs to protect groundwater quality.*

I5. *Support outreach programs to promote urban and agricultural water conservation and widespread use of water saving technologies.*

- Water recycling – Recycled water is an option from the two nearby tertiary treatment plants: Riverside RWQTP and the Western Riverside County Regional Wastewater Treatment Plant. Regional cooperation is important to minimize costs in the development and extension of recycled water systems. Identification of potential users of recycled water will be based on conveyance costs as well as on the volume, timing, and quality needs of the potential end users.

Actions

I6. *Develop partnerships with treatment plant operators and water purveyors to allow use of recycled water in the nearby area. Efforts will be made to more fully utilize effluent from Riverside's plant for non-potable uses, such as exchanges with the Gage Canal Company or expansion of the existing distribution system as explored in the City of Riverside's Recycled Water Master Plan. Usage of recycled water must balance the need for Santa Ana River in-stream flow related to the Santa Ana River Judgment.*

- Extraction – Additional groundwater extraction wells will likely be necessary to meet future demand.

Actions

I7. *Pair new wells with recharge facilities to reduce impacts, when possible. Groundwater modeling will be performed for larger wells during the planning stages to ensure that there are no significant impacts.*

6.3 MONITORING AND MANAGEMENT

6.3.1 GROUNDWATER LEVELS AND STORAGE

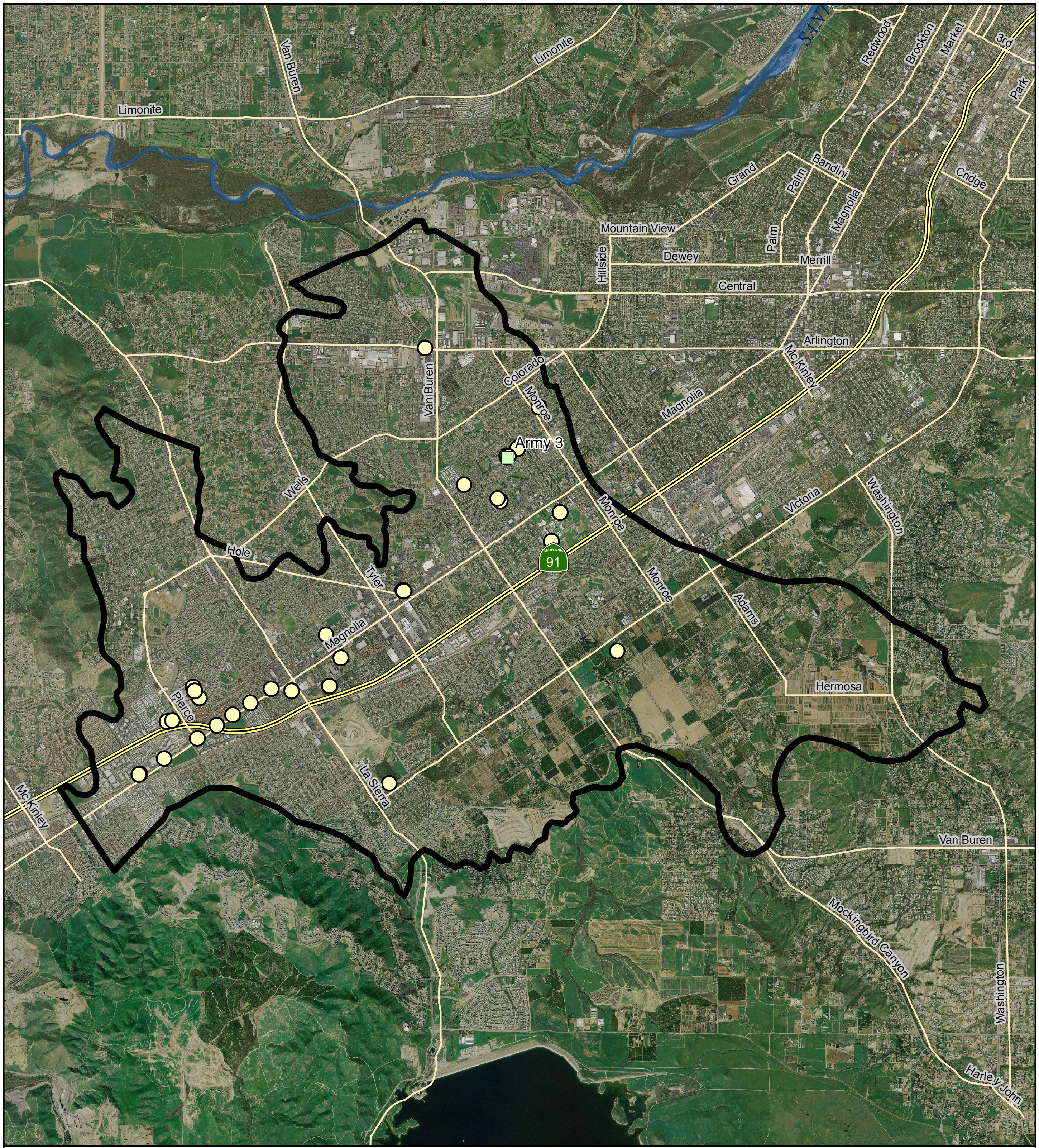
Existing wells monitored for groundwater level in the Arlington Basin are shown on Figure 6.2, which includes all wells in the Arlington Basin with the water level measured at least once in the most recent 5-year period with available data in the Cooperative Well Measuring Program Database (2005 through 2009). The water level measurements can be used to track changes in groundwater storage over time.

To the extent possible, static groundwater level monitoring should continue at all wells that are currently or have recently been measured, as shown on Figure 6.2. Water levels should be measured at least in the spring (within a month of April 15), and in the fall (within a month of November 15). Wells identified for threshold definition in the BMO (see Section 5.3) should be monitored monthly. Data logging pressure transducers should be installed in the BMO wells and in areas without good coverage to determine variability between readings, which may refine future timing of groundwater level measurements. To the extent possible, measurements should be taken when the well and nearby wells are not pumping to represent static water levels. If static conditions cannot be obtained, the pumping status at the well and nearby wells should be noted and preserved in the database, if possible. All water level data will be incorporated into the existing SAWPA databases to support broader regional water management efforts. Additionally, a portion of the water levels will be monitored and reported by Western to DWR as part of the California Statewide Groundwater Elevation Monitoring (CASGEM) program to comply with SBx7 6, which requires groundwater level monitoring and data submittal to DWR in order to remain eligible for state water grants or loans. Additional monitoring protocols are provided in Appendix D.

A key element of monitoring and management of groundwater levels and storage is the RAGFM, developed concurrently with the GWMP (WRIME, 2011a). Related to the monitoring and management of groundwater levels and storage, RAGFM is used to:

- Improve the understanding of the groundwater system
- Aggregate, organize, and analyze existing data
- Identify data gaps
- Simulate impacts on groundwater levels and storage of various programs and projects and of continuation of existing operations

The groundwater model is available from RPU or Western for use by any interested stakeholder. Output from the model is used in the GWMP to ensure that projects are designed to meet the stated goal and objectives.



Legend

- Groundwater Level Monitoring Wells*
- Transducer Wells
- Plan Area
- Highway
- Roads

* Groundwater Level Monitoring Wells are a subset of wells in the Cooperative Well Measuring Program that have groundwater measurment records from 2003 to 2007, locations derived from AWQ Database

N W E S

0 0.5 1 2 Miles

WESTERN MUNICIPAL WATER DISTRICT

Wells Monitored for Groundwater Levels

Arlington Basin Groundwater Management Plan

2010

Figure 6.2

Actions

J1. *Continue the existing static groundwater monitoring program performed through the Cooperative Well Measuring Program with consistent wells and timing of measurements.*

J2. *Ensure compliance with SBx7 6 through participation in DWR's CASGEM program.*

J3. *Coordinate among agencies to ensure that wells continue to be monitored to provide long-term records of static water levels at specific locations, and to ensure a consistent and complete dataset.*

J4. *Install additional data logging pressure transducers where needed to better understand water level fluctuations at finer time scales than captured from manual water level monitoring. Transducers will be located to fill data gaps from areas of interest such as near recharge areas, contaminated sites, or areas of significant pumping. Transducers will also be placed in wells used to monitor for the water level BMO to allow for frequent, automated measurements in addition to the manual measurements.*

J5. *Fill gaps in the water level monitoring network by sampling additional existing or newly constructed monitoring wells.*

J6. *Improve groundwater level monitoring in the Arlington Gap to improve understanding of the direction and volume of subsurface flow in this area.*

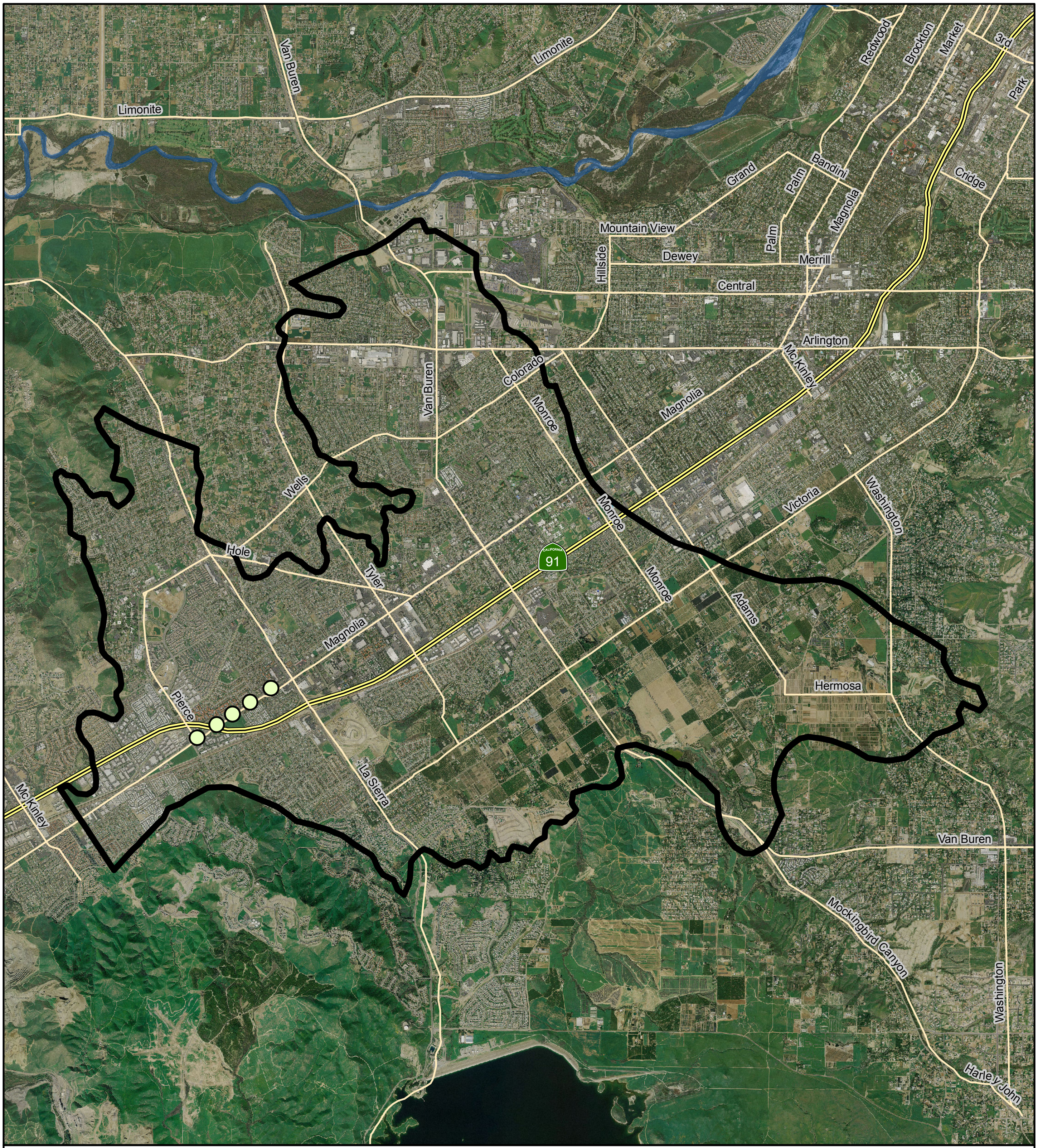
J7. *Improve understanding of bedrock topography through geophysical surveying.*

J8. *Extend groundwater modeling capabilities through the development of a groundwater quality model and an expanded regional groundwater flow model to include surrounding basins.*

6.3.2 GROUNDWATER QUALITY

Water agencies perform water quality monitoring for Title 22 compliance. Figure 6.3 shows the locations of wells monitored for water quality at least once in the most recent 5-year period with available data in the Ambient Water Quality Database (AWQ), which is now part of the SAWDMS (2003 – 2007). Additional water quality monitoring is needed to ensure sufficient data to define nitrate and TDS concentrations for use by the RWQCB and for the water quality BMOs in this GWMP, as well as to identify the presence or migration of other contaminants of concern. Monitoring protocols are contained in Appendix D. In the most recent update of ambient groundwater quality monitoring (Wildermuth, 2008b), there were insufficient data to compute nitrate and TDS concentrations for the Riverside-D Management Zone (see Figures 2.9a and 2.9b). Coordination with the RWQCB and SAWPA can help define additional monitoring needs for this ambient groundwater monitoring study. Coordination between the agencies is needed to make existing and future monitoring as complete as possible with respects to:

- Spatial distribution
- Depth interval
- Timing
- Analytes



Legend

- Groundwater Quality Monitoring Wells*
- Plan Area
- Highway
- Roads

* Groundwater Quality Monitoring Wells are derived from the AWQ Database and have records from 2003 to 2007

N
W E
S

0 0.5 1 2
Miles

WESTERN MUNICIPAL WATER DISTRICT

Wells Monitored for Groundwater Quality

Arlington Basin Groundwater Management Plan

2010

Figure 6.3

Actions

K1. *Continue groundwater quality monitoring as required to meet Title 22 requirements.*

K2. *Continue to incorporate all groundwater quality data into the existing SAWPA database to support broader regional water management efforts.*

K3. *Standardize data collection protocols and timing through coordination among agencies.*

K4. *Fill gaps in the water quality monitoring network through sampling additional existing or newly constructed monitoring wells. Filling data gaps will provide better water quality representation for Basin Plan compliance with nitrate and TDS objectives, improved understanding of water quality conditions for well siting, improved monitoring of migration of saline water, and more data for future water quality modeling.*

K5. *Coordinate with the USGS on its National Ambient Water Quality Assessment program and Groundwater Ambient Monitoring and Assessment program to potentially integrate its efforts with local monitoring efforts.*

6.3.3 CHANGES IN SURFACE FLOW AND SURFACE WATER QUALITY THAT DIRECTLY AFFECT GROUNDWATER LEVELS OR QUALITY OR ARE CAUSED BY GROUNDWATER PUMPING

Groundwater/ surface water interaction is complex and requires significant data. While there are no major rivers in the Arlington Basin, surface water resources are important, including Arlington Channel, La Sierra Channel, Arizona Channel, and Hole Lake. As shown previously in Table 4.1, approximately 4,400 AFY of recharge is provided by boundary flow and recharge from other watercourses; this is approximately two thirds of the total basin inflow of 6,690 AFY. This includes both small watercourses within the basin and recharge from the surrounding mountains. Identification, protection, and improvement of this recharge source is important to the continued recharge of the basin.

Limited data are available on the amount of surface water entering or leaving the basin. There are also limited data on the operation of the flood control basins surrounding the Arlington Basin. Improved monitoring of these resources can improve the understanding of recharge conditions and direct future projects to enhance or maintain recharge.

Actions

L1. *Coordinate with the local agencies that collect data necessary to analyze surface flow and surface water quality changes that directly affect groundwater levels or quality or are caused by groundwater pumping. Specifically, coordinate with the Riverside Flood Control and Conservation District to develop monitoring of inflows and outflows from the flood control basins.*

6.3.4 INELASTIC LAND SUBSIDENCE

Monitoring of inelastic land subsidence in the Arlington Basin is limited by the cost of traditional surveys and extensometer compared to the lack of documented historical subsidence in the basin. If land subsidence is reported in the area, or if water levels drop below historical lows, additional land subsidence monitoring will be considered. New technology, InSAR supported by GPS, allows for more cost-effective, regional scale land subsidence monitoring. Over time, these technologies are becoming more robust and less expensive. Lower costs and opportunities to partner with others such as the USGS may allow for land subsidence monitoring in the future.

Actions

M1. *Collect evidence, if any, of active inelastic land subsidence and assess the risk.*

M2. *Develop a land subsidence monitoring program, if needed, using InSAR, GPS, or traditional surveying and extensometer methods.*

M3. *Partner with the USGS or nearby agencies to implement needed monitoring.*

6.4 COORDINATED PLANNING

6.4.1 STAKEHOLDER AND AGENCY INVOLVEMENT

Ongoing stakeholder involvement, including other private groundwater producers and agencies in the groundwater basin as shown on Figure 1.3, is critical to the successful implementation of the GWMP. Interested parties include agencies within and near the basin, environmental interests, and individuals and groups that rely on the groundwater basin for water supply. Coordination with these groups is necessary to ensure that goals and objectives continue to be consistent with the desires of the community, that a full range of alternatives are considered along with potential adverse impacts, and that progress can be made toward meeting the goals and objectives.

Actions

N1. *Distribute the GWMP in an electronic format to all parties that have expressed interest in the plan, including all agencies within and bordering the basin.*

N2. *Develop a governance plan, including the appropriate MOU or JPA, and an Advisory Committee for implementation.*

N3. *Hold semi-annual meetings of the Advisory Committee to discuss ongoing groundwater management issues and activities. These discussions will include other agencies, thus enabling cooperation between public entities whose service areas or boundaries overlie the groundwater basin. Meetings will focus on potential development of more detailed governance, progress towards meeting BMOs, implementation of projects in this plan, new or updated status on the condition of the groundwater basin, and new or updated plans or strategies.*

N4. *Develop an implementation-focused GWMP web site highlighting implementation activities and soliciting public input.*

N5. *Present actions implemented by the agencies at public meetings of the respective boards.*

N6. *Provide public notice for any revisions to the GWMP.*

6.4.2 DEVELOPMENT OF RELATIONSHIPS WITH STATE AND FEDERAL REGULATORY AGENCIES

Working relationships should be developed with the following federal and state regulatory agencies :

- Federal
  - EPA – contaminated sites
  - USGS – aquifer and watershed conditions, groundwater and surface water monitoring
- State
  - DPH – drinking water quality and vulnerability
  - DTSC – contaminated sites
  - DWR – aquifer conditions, SWP, CASGEM
  - RWQCB – surface water quality and groundwater quality, permitting
  - SWRCB – water rights

<u>Actions</u>

O1. *Coordinate with these federal and state agencies on issues related to monitoring, water rights, and contaminated sites as well as on opportunities for grant funding and loans.*

6.4.3 COORDINATION WITH INTEGRATED REGIONAL WATER MANAGEMENT PLAN EFFORTS

As noted in Section 1, the Plan Area includes the Western IRWMP. Coordination during implementation of the GWMP with the IRWMP effort is important to ensure that local efforts help meet regional goals and vice-versa.

<u>Actions</u>

P1. *Ensure that at least one member of the Advisory Committee is actively involved in the coordination of the IRWMP and the GWMP. These members will provide dialogue between the two efforts.*

6.4.4 REVIEW OF LAND USE PLANS AND COORDINATION WITH LAND USE PLANNING AGENCIES TO ASSESS ACTIVITIES THAT CREATE A REASONABLE RISK OF GROUNDWATER CONTAMINATION

As discussed in Section 6.2.2, certain land uses and activities can potentially impact groundwater quality. Avoiding these uses in recharge areas and near wells is a better strategy than mitigation after the land uses are already in place.

<u>Actions</u>

Q1. *Coordinate between stakeholders and land use planning agencies to encourage the protection of groundwater resources by limiting activities that create an unreasonable risk to groundwater. Maps of well locations, or generalized areas of groundwater production, with soil properties will be provided to assist land use planning agencies in their decision process.*

Q2. *Monitor environmental impact reports and comment on such reports to ensure that the water resources are protected.*

Q3. *Involve water agencies through water supply assessments as required under SB 610. The water supply assessment documents water supply sufficiency by identifying sources of water supply, quantifying water demands, evaluating drought impacts, and providing a comparison of water supply and demand.*

6.4.5 Reporting and Updating

Reporting on the status of the GWMP implementation is important for fulfillment of the actions and projects listed in the plan. Updating the plan is necessary to reflect changing conditions and understanding of the basin.

Actions

R1. *Reports on the GWMP's implementation progress will be produced every 2 years, and will include details on monitoring activities, trigger status of BMOs, project implementation, and new or unresolved issues. Reports and status tables or maps for BMOs will be posted on the Internet, for public access.*

R2. *The GWMP will be updated every 5 years, unless changes in conditions in the basin warrant updates on a different frequency. Updates may be limited to those sections that require updating. The public will be notified of the update and the update will be performed with input from the public and the Advisory Committee.*

7 IMPLEMENTATION

Implementation of the GWMP involves performing the actions described in Section 6, Elements of the Groundwater Management Plan, to meet the BMOs which will lead to meeting the overall goal for the basin. This section describes individual opportunities, programs, and projects that may be implemented in support of the elements. These are only samples of the types of programs that can be implemented based on the elements. Final, implemented programs or projects will differ from those presented below. Potential opportunities are analyzed with the RAGFM to determine their ability as a group to meet the BMOs. A GWMP implementation schedule is provided, along with a description of development of a governance structure, dispute resolution, and financing plan.

7.1 POTENTIAL OPPORTUNITIES

There are numerous opportunities to implement the elements described in Section 6, several of which are described below. The programs or projects are presented for planning purposes to determine if these types of efforts could allow for meeting the overall goal of operating the groundwater basin in a sustainable manner for reliable supply for beneficial uses. Details were developed to a sufficient level to model the projects, but all information is very preliminary in nature as these are not specifically identified projects. Selected opportunities were modeled using RAGFM.

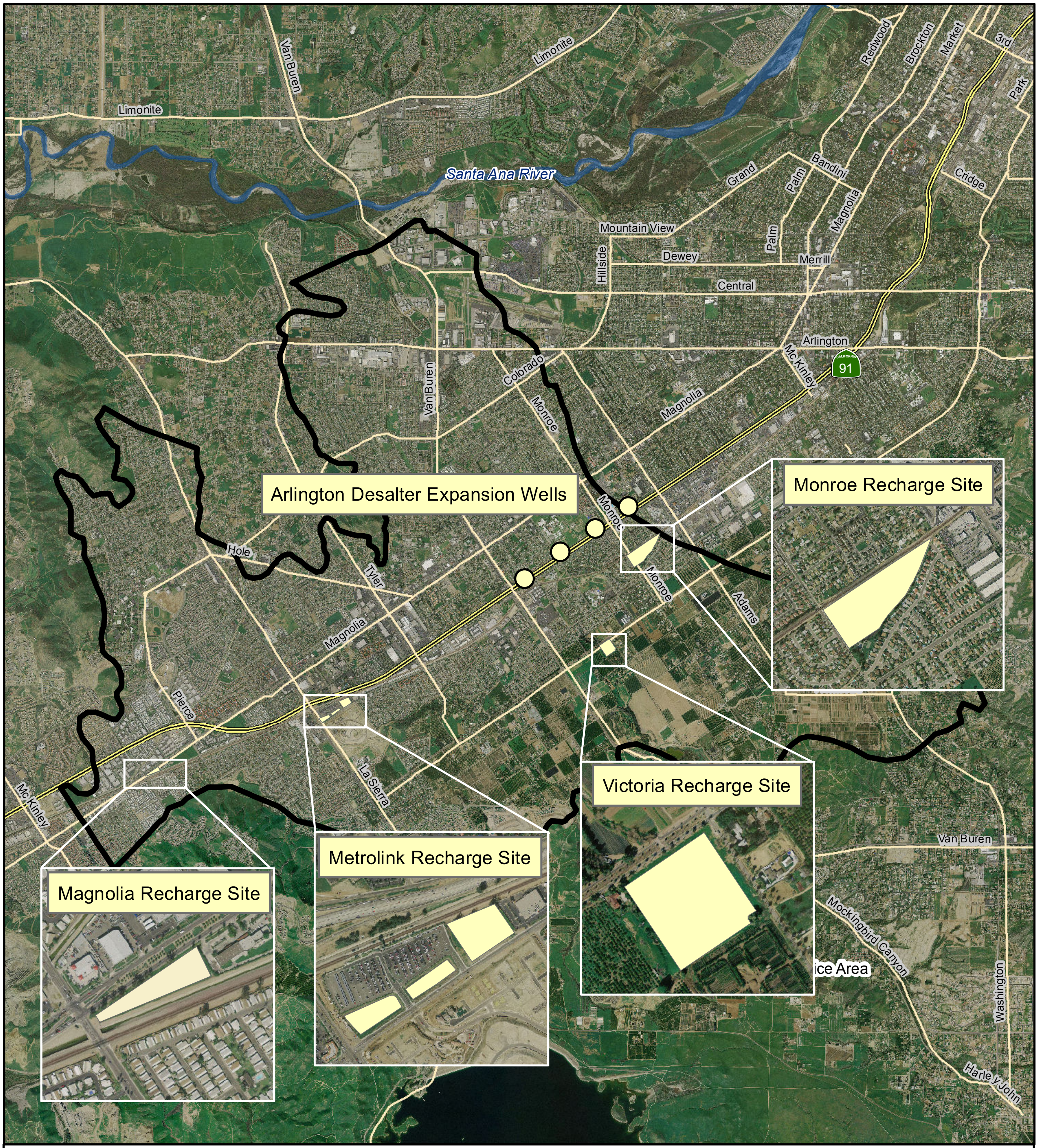
7.1.1 DESCRIPTION OF OPPORTUNITIES

7.1.1.1 Arlington Basin Recharge Facilities

Increasing recharge can increase the long-term basin yield of the basin, allowing for higher sustainable groundwater production. Four potential recharge sites in the Arlington Basin (Magnolia, Metrolink, Victoria, and Monroe) were identified in *Arlington Desalter Expansion Feasibility Study, Task 3 Summary Report* (Wildermuth, 2009) and are summarized below. Of these sites, the Magnolia Recharge Site is no longer being actively considered. The other sites are listed only as potential sites; significant additional work, including field testing and coordination with local land use agencies, would be required to further define these potential projects.

Magnolia Recharge Site

The Magnolia Recharge Site is a 2.6-acre parcel in the western portion of the Arlington Basin between Magnolia Avenue to the north, the Arlington Channel to the south, an industrial parcel to the east, and Buchanan Avenue to the west, as shown on Figure 7.1. This site would be an



Legend

- Plan Area
- Freeway
- Roads

N W E S

0 0.5 1 2 Miles

WESTERN MUNICIPAL WATER DISTRICT

Locations of Potential Opportunities

Arlington Basin Groundwater Management Plan

2010

Figure 7.1

off-channel basin, and is adjacent to the Arlington Channel and 1,000 feet from the La Sierra Channel.

The site would primarily accept dry-weather flow from the La Sierra Channel, totaling about 51 AF/month. A second potential water source for this site is storm water from the La Sierra Channel. The maximum recharge capacity for the site is approximately 510 AFY.

Metrolink Recharge Site

The Metrolink Site covers approximately 11 acres near the center of the Arlington Basin, with the Arlington Channel to the north, Indiana Avenue to the south, a bowling alley to the east, and La Sierra Avenue to the west (see Figure 7.1). This site would be an off-channel basin, and could utilize dry-weather and storm flows from the nearby the Arizona and Arlington Channels—totaling approximately 1,050 AFY. The site can also accept approximately 500 AFY of supplemental water (i.e., non-potable groundwater and/or recycled water).

Victoria Recharge Site

The Victoria Site, shown on Figure 7.1, is approximately 10 acres located downstream from Mockingbird Reservoir in the southeast part of the Arlington Basin, bordered by Victoria Avenue to the north, an agricultural parcel to the south, Jackson Street to the east, and an agricultural parcel to the west. This site would be a flow-through basin; storm water will not need to be diverted and conveyed to the basin. Water may be available from storm water, including releases from Mockingbird Reservoir, as well as non-potable groundwater and/or recycled water from Western's non-potable system. Imported water may also be used from the Gage Canal Company's pipeline.

Monroe Recharge Site

The Monroe Site is a 5-acre parcel located in the eastern part of the Arlington Basin, as shown on Figure 7.1, within a RCFCWCD detention basin. This site is both a detention basin for flood control and a park/sports complex for the City of Riverside. The site is situated between railroad tracks to the north, a residential neighborhood to the south and east, and Monroe Street to the west. This site will be a flow-through basin: Storm waters will not need to be diverted and conveyed to the basin.

The site can accept approximately dry-weather flow and storm water from two large storm drains that terminate at the site. Supplemental water from Western's non-potable system could also serve as a relatively small additional source for this site.

7.1.1.2 Arlington Desalter Expansion

The desalter expansion involves the construction of up to four new wells (up to three active wells and up to one standby well) in the eastern portion of the basin near the boundary with the

Riverside Basin. Given the current state of overdraft in the basin, the expansion would likely only occur in concert with recharge projects. The new desalter wells are assumed to begin pumping in 2017 and supply the desalter facility with approximately 6,000 AFY — approximately 4,000 AFY necessary for the facility expansion to up to 10 mgd of product water; and a shift of about 2,000 AFY that is currently produced from the existing desalter wells. Figure 7.1 shows the locations of the existing and potential new desalter wells. A raw water pipeline of approximately 4.5 miles in length would need to be installed to convey the groundwater from the new wells to the desalter facility (Wildermuth, 2008a).

7.1.1.3 Regional Groundwater Modeling

The RAGFM is an important tool for groundwater management in the Riverside and Arlington Basins. However, these basins are connected with other basins in the region. During development of the RAGFM, boundary conditions were coordinated with the groundwater models in the surrounding basins to ease the development of a future regional groundwater model at a larger scale. Such a groundwater model would assist in improving the representation of flow between the basins and would assist in understanding regional flow conditions and their impacts on contaminant plumes, salts, and other regional issues.

7.1.1.4 Groundwater Quality Modeling

The addition of a groundwater quality component to the existing RAGFM or the development of a new groundwater quality model would assist in the management of non-point source and point source contaminants. This includes improved salt management and an improved ability to quantify impacts of water supply projects on regional contaminant plumes and on regional ambient groundwater quality.

7.1.2 Simulated Benefits and Impacts

The RAGFM (See Section 1.3) was used to simulate the potential benefits and impacts of different combinations of potential opportunities within both the Arlington Basin and the Riverside Basin. The simulations compared simulated baseline conditions to conditions with the potential impacts to estimate the benefits and impacts. The following describes modeling results for the baseline and three hypothetical modeling scenarios. Table 7.1 summarizes the simulations and the results.

Table 7.1
Model Simulated Basin Conditions

		Simulation											
		Existing Conditions Baseline			**Scenario 2**			**Scenario 3**			**Scenario 4**		
		Riverside North	Riverside South	Arlington	Riverside North	Riverside South	Arlington	Riverside North	Riverside South	Arlington	Riverside North	Riverside South	Arlington
Groundwater Production (AFY)													
	Flume Wells 2-6	8,210			10,000			10,000			8,210		
	Flume Well 7				4,360			4,360			4,360		
	Colton Wells 30 and 31				8,070			8,070			4,035		
	West Valley New Wells							8,630			3,090		
	WMWD Desalter Wells 1-5			5,200			7,800			7,420			5,025
	WMWD New Desalter Wells									1,935			3,610
	RIX Extraction**	35,800			35,800			35,800			35,800		
	Pellissier ASR Extraction Wells											10,000	
	Other Wells**	20,090	36,330	1,130	20,090	36,330	1,200	20,090	36,480	1,385	20,075	36,310	335
	Subtotal	**64,100**	**36,330**	**6,330**	**78,320**	**36,330**	**9,000**	**86,950**	**36,480**	**10,740**	**75,570**	**46,310**	**8,970**
Groundwater Recharge at Recharge Facilities (AFY)													
	ASR On-Channel Facility (in Rialto-Colton Basin)***				10,000			21,920					
	ASR Off-Channel Facility				3,000			8,980			6,000		
	Pellissier ASR Facility										10,000		
	RIX Percolation Basin Feed**	28,100			28,100			28,100			28,100		
	Arlington Basin Recharge Facilities						3,000			3,980			2,970
	Subtotal	**28,100**	**0**	**0**	**31,100**	**0**	**3,000**	**37,080**	**0**	**3,980**	**44,100**	**0**	**2,970**
Long-Term Average Storage Change (AFY)*		**-1,100**	**-1,280**	**-380**	**-1,230**	**-1,260**	**-260**	**-230**	**-700**	**-420**	**-1,590**	**-1,750**	**-40**
Long-Term Average Groundwater Head (ft)*													
1969 Western Judgment Index Wells	Johnson 1 (in Rialto-Colton Basin)	861.2			866.0			889.7			854.6		
	Flume 2	850.9			849.7			880.2			843.3		
	Flume 5	847.5			845.5			873.2			840.4		
	Average of 3 index wells	853.2			853.7			881.0			846.1		
Riverside North Basin	RA24 (CPC East Side)	850.2			848.5			871.8			842.5		
	RA21 (Twin Butte #6)	829.4			826.8			840.8			819.8		
	RA17 (#8)	833.1			826.7			854.7			820.7		
Riverside South Basin	RE9 (Mulberry)		755.5			753.1			763.7			745.5	
	RC1 (#14, 46th Street)		743.6			743.5			743.8			743.1	
	RD3 (Laura Lane)		739.7			743.6			741.6			735.5	
Arlington Basin	A3 (Buchanan #1)			623.5			638.9			607.9			638.9
	A21 (Water Tower)			737.7			728.3			736.3			728.3

Notes:
* Long-term average is over the 43 years of simulation representing the long-term hydrologic conditions of 1965 to 2007.
** Based on 2007 groundwater recharge and production data.
*** ASR On-Channel Facility recharge is not included in the calculations for Riverside North as this facility is located in Rialto-Colton. Impact of the ASR On-Channel Facility is observed in changes in boundary inflow from Rialto-Colton to Riverside North.

7.1.2.1 Scenario 1: Existing Conditions Baseline

The objective of the Existing Conditions (EC) baseline simulation is to define the land use and water demand and hydrologic conditions that will be used as the basis for comparison of near-term model simulations. The EC baseline represents the basin under the current (2007) land and water use conditions. It is also used to estimate the long-term basin yield under current land use and water demand conditions over the long-term hydrologic conditions. The assumptions, data, and results for the EC Baseline are presented in *Riverside-Arlington Groundwater Flow Model (RAGFM): Model Development and Scenarios* (WRIME, 2011a).

7.1.2.2 Scenario 2: Near-Term Future Projects Conditions

The objective of the near-term future projects conditions (Scenario 2) is to evaluate the sustainability of selected future groundwater recharge and production projects and the effectiveness of these projects in offsetting projected overdraft. The impacts of these projects on groundwater resources were evaluated by comparing the results of Scenario 2 with the EC Baseline results. Scenario 2 represents the EC Baseline land use and water demand conditions with the addition of the following selected projects:

- Proposed Arlington Basin recharge facilities
  - Metrolink Basin
  - Monroe Basin
  - Victoria Basin
- Operation of Existing Arlington Desalter Wells at 7,840 AFY

Additionally, the following projects are included in the Riverside Basin:

- Proposed Riverside North Aquifer Storage and Recovery Facilities, consisting of:
  - Inflatable Dam and On-Channel Recharge Facilities
  - Off-Channel Recharge Facilities
- Proposed Flume 7 Well in Riverside North

Groundwater level impacts of Scenario 2 include mounding at the Victoria recharge site (see Figure 7.1) and lower groundwater levels (compared to EC baseline) in the vicinity of the existing desalter wells and in the area west of La Sierra Avenue due to higher desalter production rates of Scenario 2.

Scenario 2 simulates an average change in storage of -260 AFY for the Arlington Basin (see Table 7.1). This value is 110 AFY higher than the EC Baseline. Details of the scenario and the results are included in *Riverside-Arlington Groundwater Flow Model (RAGFM): Model Development and Scenarios* (WRIME, 2011a).

7.1.2.3 Scenario 3: Long-Term Future Projects Conditions

The objective of Scenario 3 is to estimate the maximum volume of water that can be recharged at the ASR Facilities within certain constraints and evaluate the sustainability of selected future groundwater production projects. The impacts of these projects on groundwater resources were evaluated by comparing the results of Scenario 3 and the EC Baseline. Scenario 3 represents the EC Baseline land use and water demand conditions with the addition of the Scenario 3 projects:

- Proposed Arlington Basin Recharge Facilities
  - Metrolink Basins
  - Monroe Basin
  - Victoria Basin
- Operation of Existing Arlington Desalter Wells
- Proposed New Arlington Desalter Wells

Additionally, the following projects are included in the Riverside Basin:

- Proposed Riverside North Aquifer Storage and Recovery Facilities consisting of:
  - Inflatable Dam and On-Channel Recharge Facilities
  - Off-Channel Recharge Facilities
- Proposed Flume 7 Well
- Colton Wells 30 and 31
- Proposed West Valley Water District (WVWD) wells at 11,190 AFY

Scenario 3 simulates an average change in storage of -430 AFY for the Arlington Basin (see Table 7.1). This value is 70 AFY lower than the EC Baseline. Details of the scenario and the results are included in *Riverside-Arlington Groundwater Flow Model (RAGFM): Model Development and Scenarios* (WRIME, 2011a).

7.1.2.4 Scenario 4: 2015 Future Projects Conditions

The objective of Scenario 4 is to evaluate the sustainability of 2015 future groundwater recharge and production projects and the effectiveness of these projects to offset projected overdraft. The intent of Scenario 4 for Riverside North Basin is to evaluate the impact of new production wells with the ASR Facilities operating at lower recharge rates. Additionally, the impact of the Pellissier Ranch ASR Facilities was evaluated. The impacts of these projects on groundwater resources were evaluated by comparing the results of Scenario 4 and the EC Baseline. Scenario 4 represents the EC Baseline land use and water demand conditions with the addition of the Scenario 4 projects:

- Proposed Arlington Basin Recharge Facilities
  - Monroe Basin
  - Victoria Basin
- Existing Arlington Desalter Wells
- Proposed New Arlington Desalter Wells
- Reduced Groundwater Production by La Sierra University Wells

Additionally, the following projects are included in the Riverside Basin:

- Proposed Riverside North Aquifer Storage and Recovery Facilities consisting of Off-Channel Recharge Facilities
- Pellissier Ranch ASR Facilities
- Proposed Flume 7 Well
- Colton Well 30
- Proposed West Valley Water District (WVWD) wells operating at 5,650 AFY

Scenario 4 simulates an average change in storage of 40 AFY for the Arlington Basin (see Table 7.1). This value is 410 AFY higher than the EC Baseline and is greater than zero, indicating no overdraft on an annual average. Details of the scenario and the results are included in *Riverside-Arlington Groundwater Flow Model (RAGFM): Model Development and Scenarios* (WRIME, 2011a).

7.2 GOVERNANCE

The governance of the Arlington Basin will be determined through discussions amongst the stakeholders. Currently, the basin's governance is based on the individual-interest model. Under the individual-interest model, stakeholders govern and develop water resource projects individually. However, it is envisioned that under this plan the development of projects will be done following the common goal, objectives, and elements described herein. Additionally, coordination between stakeholders will allow for easier implementation of projects that span all or a portion of the basin.

Initial stakeholder meetings will focus on development of a governance structure, likely through a Memorandum of Understanding (MOU) (individual-interest model) or through a Joint Powers Agreement (JPA) (mutual-interest model). Meetings will be hosted in which representatives from each stakeholder group can get together to discuss and seek to resolve regional groundwater issues. At these meetings, agreements can be made if multiple groups would like to contribute to the development of regional projects outlined in the GWMP; however, the ultimate project-making authority remains within the entity sponsoring the project, unless a JPA is formed through the governance process. Financing is also the responsibility of the sponsoring agency or group, again, unless a JPA is formed through the governance process. The individual groups can enter into agreements to guide subsequent actions and provide funding. Voting at the meetings will be limited to those that have adopted or agreed to the GWMP, although other stakeholders will be encouraged to attend and participate in discussions in a non-voting role.

Advantages to the individual-interest-based approach are:

- Agencies can focus their resources on projects specific to their needs
- There is no loss of management control of individual groundwater resources
- It is easiest to implement because it is a continuation of the current approach to groundwater management in the region

A MOU is needed to formalize such an individual-interest-based model. The MOU would be signed by the water agencies following adoption of the GWMP.

The need for more cohesive management may lead to a mutual-interest model based on a MOU or JPA. The mutual-interest model would:

- Ease pursuing regional projects that would benefit the entire Arlington Basin
- Define who coordinates projects and what role each agency plays during regional project planning, construction, operation, and maintenance
- Generate economies of scale for large projects
- Increase the likelihood of state funding for projects benefiting multiple entities
- Prevent individual stakeholders from undertaking actions that are not complementary to the BMOs
- Expand the framework to resolve conflicts among individuals

A series of meetings will be held with stakeholders to define the appropriate governance structure, prepare and execute the MOU or JPA, and begin governance activities.

7.3 DISPUTE RESOLUTION

Disputes relating to the implementation of the GWMP will be resolved by the Advisory Committee. In the event that the Advisory Committee cannot resolve the dispute, an outside neutral third party will be used to assist the parties in working towards a satisfactory resolution, with completion of all procedures within 60 to 90 days, unless the parties to the dispute agree to a longer timeframe. Costs incurred, if any, in this process will be equally shared by the involved parties.

7.4 FINANCING

As discussed above, financing for individual projects will depend on the governance structure selected by the stakeholders. Under the individual-interest model, financing for projects would come from the proponent, and other beneficiaries if agreements are made. Under the mutual-interest model, financing for projects, reporting, and plan updates could come from the JPA, which in turn is funded by the members. It is anticipated that Western will, at their discretion, provide for updating the GWMP and for the development of annual reports for the entire Arlington Basin, with support from the plan participants for data and review.

7.5 SCHEDULE

Key implementation items are listed in the following schedule:

Item	*Initial Completion*	*Recurrence*
Meet with stakeholders to define and adopt a governance structure	*1 year*	*n/a*
Expand desalter capacity to manage water quality and create supply	*6 years*	*As needed*
Develop recharge facilities to increase yield	*6 years*	*As needed*
Develop groundwater quality model	*4 years*	*As needed*
Fill data gaps in water quality network	*5 years*	*As needed*
Complete subsidence analysis using InSAR	*3 years*	*As needed*
Continue public outreach and education	*2 years*	*Ongoing*
Report on GWMP	*3 years*	*2 years*
Update GWMP	*5 year*	*5 years*

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APPENDIX A – RESOLUTIONS AND PUBLIC HEARING ADVERTISEMENTS

APPENDIX B – GEOLOGIC CROSS-SECTIONS

APPENDIX C – CONSUMER CONFIDENCE REPORTS

APPENDIX D – MONITORING PROTOCOLS

APPENDIX A – RESOLUTIONS AND PUBLIC HEARING ADVERTISEMENTS

PUBLIC NOTICES

PUBLIC NOTICE GROUNDWATERMANAGEMENT PLAN

NOTICE IS HEREBY GIVEN that at 9:30 a.m. on November 19, 2008 at its offices located at 450 Alessandro Boulevard, Riverside, California 92508, the Western Municipal Water District (District) will hold a public hearing on whether or not to adopt a resolution of intention to draft a groundwater management plan for the Arlington Groundwater Basin pursuant to California Water Code section 10750 et seq. for the purposes of implementing the plan and establishing a groundwater management program.

Landowners within the District's service territory and other interested parties are invited to attend the hearing. Draft copies of the proposed resolution of intention to draft a groundwater management plan will be available for review by the public at the hearing or may be obtained in advance of the hearing at the District's offices at , 450 Alessandro Boulevard, Riverside, California 92508. Opportunity for public comment and input will be provided at the hearing. In accordance with Water Code section 10753.4(b), landowners and other interested parties who wish to participate in developing the groundwater management plan may do so by attending the hearing and indicating their interest, or by submitting a written request to participate to Fakhri Manghi, 450 Alessandro Boulevard, Riverside, California 92508.

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this public hearing, please contact Patti Webster at (951) 789-5024. Notification forty-eight (48) hours prior to the hearing will enable the District to make reasonable arrangements to ensure accessibility to the hearing.

The public is invited to attend and comment in the process described above. Due to time constraints and to enable multiple persons the opportunity to provide oral comment, each speaker will be limited to three minutes. Written comments may also be submitted to the District for inclusion in the public record. Any person or party challenging this process in court may be limited to raising only those issues raised by that person or party or by someone else at the public hearing described in this notice, or in written correspondence delivered to the District at or prior to the public hearing. Any person unable to attend the public hearing may submit written comments to the Western Municipal Water District, 450 Alessandro Boulevard, Riverside, California 92508. If you have questions regarding this notice or the matter to be heard, please contact Fakhri Manghi at (951) 789-5090.

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F6 WEDNESDAY, NOVEMBER 12, 2008

PUBLIC NOTICES

PUBLIC NOTICE
GROUNDWATERMANAGEMENT PLAN

NOTICE IS HEREBY GIVEN that at 9:30 a.m. on November 19, 2008 at its offices located at 450 Alessandro Boulevard, Riverside, California 92508, the Western Municipal Water District (District) will hold a public hearing on whether or not to adopt a resolution of intention to draft a groundwater management plan for the Arlington Groundwater Basin pursuant to California Water Code section 10750 et seq. for the purposes of implementing the plan and establishing a groundwater management program.

• Landowners within the District's service territory and other interested parties are invited to attend the hearing. Draft copies of the proposed resolution of intention to draft a groundwater management plan will be available for review by the public at the hearing or may be obtained in advance of the hearing at the District's offices at , 450 Alessandro Boulevard, Riverside, California 92508. Opportunity for public comment and input will be provided at the hearing. In accordance with Water Code section 10753.4(b), landowners and other interested parties who wish to participate in developing the groundwater management plan may do so by attending the hearing and indicating their interest, or by submitting a written request to participate to Fakhri Manghi, 450 Alessandro Boulevard, Riverside, California 92508.

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this public hearing, please contact Patti Webster at (951) 789-5024. Notification forty-eight (48) hours prior to the hearing will enable the District to make reasonable arrangements to ensure accessibility to the hearing.

The public is invited to attend and comment in the process described above. Due to time constraints and to enable multiple persons the opportunity to provide oral comment, each speaker will be limited to three minutes. Written comments may also be submitted to the District for inclusion in the public record. Any person or party challenging this process in court may be limited to raising only those issues raised by that person or party or by someone else at the public hearing described in this notice, or in written correspondence delivered to the District at or prior to the public hearing. Any person unable to attend the public hearing may submit written comments to the Western Municipal Water District, 450 Alessandro Boulevard, Riverside, California 92508. If you have questions regarding this notice or the matter to be heard, please contact Fakhri Manghi at (951) 789-5090.

11/5,12

MINUTES
REGULAR MEETING OF THE BOARD OF DIRECTORS OF THE
WESTERN MUNICIPAL WATER DISTRICT
OF RIVERSIDE COUNTY

November 19, 2008

CALL TO ORDER / PLEDGE OF ALLEGIANCE

20583 The Regular Meeting of the Board of Directors of Western Municipal Water District was called to order in the District office at 9:30 a.m., November 19, 2008 and Director Evans led the Pledge of Allegiance to the flag.

20584 **Directors Present**
President S.R. Al Lopez, Presiding
Tom Evans, Vice President
Charles D. Field, Secretary-Treasurer
Brenda Dennstedt
Donald D. Galleano

Others Present
John Rossi, General Manager
Jeff Sims, Assistant General Manager/COO
Jeff Minkler, Chief Financial Officer
Paul Rugge, Assistant General Manager/CAO
Joe Bernosky, Director of Engineering
Tedi Jackson, Public Affairs Manager
Greg Duecker, IT Manager
Tim Barr, Water Use Efficiency Manager
Kevin Mascaro, Controller
Randy Toepher, Construction Management Supervisor
Patti Webster, Recording Secretary
Sonya Bloodworth, Executive Assistant
Michele Underwood, Public Affairs Representative
Lawrence McGuire, Public Affairs Representative
Derek Kawaii, Principal Engineer
Fakhri Manghi, Engineering Services Coordinator
Wayne Cawelti, IT Specialist
Son Bui, Creative Services Specialist
Jeff Ferre, Best, Best & Krieger
Mark Easter, Best, Best & Krieger
Mr.Hanna, Westin
Ed Indvik, Indvik Holdings, LLC
Tim Skrove, Metropolitan Water District
Susie Erp, Cal State San Bernardino University

M-5819 – Approval of Consent Calendar

20585 A motion was made by Director Galleano, seconded by Director Dennstedt, to approve the Consent Calendar. Motion carried 5-0. The following Consent Calendar items were thereby approved and authorized:

2-1 Approve Directors' Requests for Compensation
2-2 Approve CIS Contract with Independent Consultant for Professional Services (N. Harris Computer Corp) (contract available for review upon request)
2-3 Approve Adoption of Resolution 2568, Flexible Spending Account Plan
2-4 Recommendation to Take Action to Cancel December 3, 2008 Regular Board Meeting
2-5 Approve Purchase of Vehicles for the Operations Center
2-6 Approve the Corona-Western Promenade Connection Project and Adopt Resolution 2572 for the Final Mitigated Negative Declaration

- END OF CONSENT CALENDAR -

Reports

20586 Item 5-1 – Presentation of JPIA Employee Recognition Award

General Manager John Rossi asked Director of Engineering Joe Bernosky to speak on the JPIA Employee Recognition Award. Mr. Bernosky said staff was present to honor Randy Toepher, Construction Management Supervisor, for taking a number of courses over the past four years which are offered through the ACWA/JPIA professional development program. Mr. Toepher has now completed the Supervisor Basics class. This is a tremendous dedication of personal time and effort to improve professional skills and Mr. Bernosky went on to present the award to Mr. Toepher. Mr. Toepher said he really appreciated Western giving him the opportunity to complete the program and also the support of staff.

M-5820 – Conduct Public Hearing and Consider Adoption of Resolution 2570, Intent to Adopt a Groundwater Management Plan for the Arlington Desalter

20587 President Lopez announced that this was the time and place fixed for the Public Hearing on the proposed Resolution 2570 which is a Resolution of Intention to draft a Groundwater Management Plan for the Arlington Groundwater Basin.

President Lopez then called upon Staff to provide a brief description of the proposed Resolution of Intention.

General Manager John Rossi reported that more than two years ago, staff started working with the City of Riverside staff on the Riverside South and North Basin and the Arlington Basin. Mr. Rossi said he was pleased to provide the opportunity for WMWD to take the lead in regard to this activity for the Groundwater Management Plan for the Arlington Basin. This Resolution of Intention is to draft a Groundwater Management Plan for the Arlington Groundwater Basin in accordance with the provisions of Water Code, section 10750 *et seq*.

Mr. Rossi also reported that in 1992, the California Legislature passed Assembly Bill (AB) 3030, which was designed to provide local public agencies with increased management authority over groundwater resources. Any local public agency which provides water service to all or to a portion of its service area and whose service areas includes all or a portion of a groundwater basin may adopt a Groundwater Management Plan (GWMP). The goals of the Arlington Basin GWMP will be determined through a stakeholder process, which will include WMWD. It is anticipated that these goals would relate to ensuring that groundwater remains a reliable and cost-effective water supply to meet current and future municipal, industrial, and agricultural needs.

Legal Counsel Jeff Ferre stated hat notice of this hearing was given pursuant to the requirements of Water Code Section 10750 et seq. Draft copies of the proposed resolution were made available for review by the public and are available at this hearing. Landowners and other interested parties who wish to participate in developing the groundwater management plan may do so by attending this hearing and indicating their interest, or by submitting a written request to participate.

Mr. Ferre also reported that written comments may also be submitted to the District for inclusion in the public record. Any person or party challenging this process in court may be limited to raising only those issues raised by that person or party or by someone else at this hearing, or in written correspondence delivered to the District prior to the close of this hearing. Notice having been provided and published by Staff, it would now be appropriate to conduct the public hearing. This is a pubic hearing for the receipt of public testimony on the proposed resolution. Therefore, there will not be Board or Staff responses during the hearing. A discussion of the proposed resolution by the Board will take place after the close of the hearing and prior to any action.

President Lopez announced that the Public Hearing was now open and that anyone who wished to speak could forward and would be requested to identify themselves for the records. Speakers were given the customary 5 minutes to speak.

There was no one who wished to speak and there was no one who wished to provide written testimony.

President Lopez then closed the public hearing and the Board took up consideration of the proposed resolution.

Mr. Ferre said that now was the time for the Board to discuss and ask questions regarding the proposed resolution. Director Evans asked why the public hearing was being held before the plan had been developed. Mr. Ferre explained that the applicable law requires the District to adopt this resolution of intention in order to provide notice and the opportunity for the public, stakeholders and property owners to become involved in the preparation of the ultimate plan and to provide input regarding: (a) whether or not there should be a Groundwater Management Plan even developed; and (b) whether or not they would want to participate in the preparation of such a plan. There will be a public hearing and full consideration once that plan is developed and prior to its proposed adoption.

The following motion was made by Director Field, seconded by Director Evans approving adoption of Resolution 2570. Motion carried 5-0.

RESOLUTION 2570
RESOLUTION OF INTENT OF THE BOARD OF DIRECTORS OF WESTERN MUNICIPAL WATER DISTRICT OF RIVERSIDE COUNTY TO DRAFT A GROUNDWATER MANAGEMENT PLAN FOR THE ARLINGTON DESALTER BASIN

(See Resolution Book)

Reports

20588 Item 5-2 – Presentation of Lois B. Krieger Scholarship

Public Affairs Manager Tedi Jackson said staff was here today to congratulate a Cal State San Bernardino student for being awarded the Lois B. Krieger Scholarship. Ms. Jackson first introduced Tim Skrove from the Metropolitan Water District (MWD) and Susie Erp from Cal State San Bernardino who also participated in the scholarship presentation. Ashley Hewitt was then presented with the scholarship award as a combination of three scholarships from WMWD, MWD and Krieger and Stewart for water and engineering science studies at Cal State San Bernardino. Ashley Hewitt spoke and thanked the board, MWD and Krieger and Stewart for the scholarships. She said she is very interested in water and knows how essential it is to all of us. Susie Erp thanked the District on behalf of the Water Resources Institute of Cal State San Bernardino for making this possible. She said there are quite a few new interns and she feels the District will see more applicants as the years go by.

Closed Session

20589 At 9:50 a.m. Mr. Ferre said the Board would now go into Closed Session on Item 7.1 and Item 7.2 and announced that the following individuals would also be attending the Closed Session as additional Agency Negotiators: John Rossi, Edward Indvik and Paul Rugge.

7.1 CONFERENCE WITH REAL PROPERTY NEGOTIATORS:
Pursuant to Government Code Section 54956.8;
Property: APNs 135-220-021, 023, 025, 027, 030
Agency Negotiator: Jeff Sims, Jack Safely and Mark Easter
Negotiating Parties: LA-Magnolia Spectrum, LLC
Under Negotiation: price and terms of payment

7.2 CONFERENCE WITH REAL PROPERTY NEGOTIATORS
Pursuant to Government Code Section 54956.8
Property: A parcel of land identified as APN 132-020-038
Agency Negotiators: Jeff Sims, Jack Safely and Legal Counsel Mark Easter
Negotiating Party: Cubeiro
Under Negotiation: price and terms of payment

The Board came out of Closed Session and reconvened into Open Session at at 10:36 a.m. Legal Counsel Ferre reported there was no reportable action taken on Closed Session Item 7.1 and Item 7.2.

General Manager and Staff Reports

20590 Mr. Rossi said the District's financial team was present today and asked Robert Porr, Fieldman, Rolapp & Associates and Jeff Bower of Merrill Lynch to give the Board and staff an update on the 2002A Bond Swap. Mr. Porr referred to the handout given to the Board and proceeded to recap the current status of the 2002A Bonds.

SAWPA Report

20591 Director Galleano said the Arlington Desalter was discussed at length at the last SAWPA meeting. He voiced concern regarding ad valorem taxes and protecting them from the State. External Affairs Officer Phil Rosentrater said there is a legal review being conducted at this time as it seems that on the state level, there still may be an effort to go after special districts' property taxes.

General Counsel Report

20592 Legal Counsel Jeff Ferre reported, adding to the last comment made on property taxes, in terms of the legal review and potential actions to protect said revenues from various threats.

MWD Report

20593 President Lopez reported on the following:

- The MWD update that has been distributed which recaps some of the actions taken by the Board, adding that the conservation ordinance discussion was very lively and members expressed an interest to have a conservation ordinance in place for agencies to make an effort for water conservation. The ordinance was approved for fifty conservation programs and this will come back to the Board in December to discuss the criteria associated with the phase-in period. Mr. Rossi added that the District has worked with the school districts and others to get various large checks moving forward and have been very successful.
- The disposition of surplus material/equipment from the tunnel digging that Richie Bros in Perris is auctioning off. There was a lot of discussion on the profits and on which agencies would get what amount. This action item was deferred to the December meeting so details can be discussed.
- President Lopez also reported on recent financial matters which were discussed at the last MWD meeting. In that regard, Director Evans stated that he would like Western to closely watch how MWD arrives at decisions regarding cost factors associated with water and MWD rates and would like the District to do its own analysis. President Lopez added that he serves on MWD's Finance committee and there has been a discussion regarding the drivers leading to a possible rate increase. Mr. Rossi suggested that a MWD representative be invited to attend a District board meetings to give a presentation on what the drivers are for the next rate increase as a background and this could then be followed up with a more in-depth discussion.

WRCOG Report

20594 Director Evans reported that WRCOG has what is called the 'red team' and there was much discussion at the last meeting on how to restart the housing industry and how to deal with all of the foreclosures. One of the issues is how to get fees reduced so the costs to build a house would be less expensive. This would also generate more work for those in need of employment. Director Evans also said with California having the highest unemployment rate in the country, it would make sense for the District to work with other entities to accelerate various public works projects.

Directors Reports

20595 Director Field reported on the following:

- Attended the 'Use Water Wisely' event at Diamond Valley Lake which went off well. Staff did a great job as always.
- Mr. Rossi thanked Jack Safely, John Shatz and Director Field who worked hard with all the entities to get the amendment completed so the District could join the Chino Desalter Authority. The final agency, Chino Hills, adopted the amendment on November 17, 2008. The next step will be for the Board to approve one of its own members to sit on the Authority's board. Jack Safely, Director of Water Resources will be the District's technical appointee/representative on the Technical Advisory committee (TAC). Director Galleano asked about the voting process and Mr. Safely responded that Director Galleano's concern is being addressed.

Director Dennstedt reported she attended a check presentation in the amount of $242,000 to Rancho California Water District (RCWD) who has received almost $1,000,000 to date for the rebate programs which reflects their customers installing the right equipment for conservation.

Director Galleano reported he attended a reception at Cal State San Bernardino in honor of Mr. Grindstaff and Mr. Webb and felt it was very successful.

Director Lopez reported on the mid-county parkway, stating that there is some information regarding the water quality and he requested a copy of the component of the water quality and storm run-off of the parkway. If there is any information that pertains to the District he would appreciate staff reviewing said information.

General Manager and Staff Reports

20596 General Manager Rossi reported on the following:

- The board took action to cancel the December 3rd board meeting but the December 17th board meeting will still take place followed by the Board holiday luncheon.

- On the first board meeting in January there will be the staff report on officer changes. This board had adopted a policy when first formed two years ago which provides for a rotation process.

- There were several staff recognitions - MESAC has a 4 level process for IT Best Practices. This is the first year the District has participated in the program and was awarded the second level which was a great recognition. The district also received the CAFER award for financial reporting and this is the third year in a row for this award. AWURF, a research organization expressed their appreciation to WMWD for 15 years of participation.
- External Affairs Officer Phil Rosentrater will be moderating a panel at the upcoming ACWA conference on Prop 1A protection. Mr. Rossi said he will also be moderating a panel of groundwater experts on the impact of groundwater basin operations relative to the water supply shortage.

Adjourn

20596 There being no further business to come before the Board, at 11:26 a.m. President Lopez adjourned the meeting.

THOMAS P. EVANS
President

Brenda Dennstedt
BRENDA DENNSTEDT
Secretary-Treasurer

THE PRESS-ENTERPRISE

3450 Fourteenth Street
Riverside CA 92501-3878
951-684-1200
951-368-9018 FAX

PROOF OF PUBLICATION
(2010, 2015.5 C.C.P.)

Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc.: Resolution 2570

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper of general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673 and under date of August 25, 1995, Case Number 267864; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

01-22-09
01-29-09

I Certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: Jan. 29, 2009
At: Riverside, California

WESTERN MUNICIPAL WATER DISTRICT

ATTN: BJ CARROLL
P.O. BOX 5286
RIVERSIDE CA 92517

Ad #: 9669432

PO #:

Agency #: ______________

Ad Copy:

RESOLUTION 2570
RESOLUTION OF INTENT OF THE BOARD OF DIRECTORS OF THE WESTERN MUNICIPAL WATER DISTRICT TO DRAFT A GROUNDWATER MANAGEMENT PLAN FOR THE ARLINGTON GROUNDWATER BASIN

WHEREAS, the Western Municipal Water District ("WMWD") was formed by the voters in 1954 for the purpose of importing water supplies from the Metropolitan Water District of Southern California; and

WHEREAS, WMWD is a local public water agency as defined by Water Code section 10752(g) that provides water service within its service area and is thus authorized pursuant to Water Code section 10750 et seq. to adopt and implement a groundwater management plan within all or a portion of WMWD's service area; and

WHEREAS, WMWD's service area includes all or a portion of the Arlington Groundwater Basin ("Basin"), which Basin is not subject to groundwater management pursuant to other provisions of law or a court order, judgment or decree; and

WHEREAS, the preparation and adoption of a groundwater management plan for the Basin pursuant to Water Code section 10750 et seq. will help identify sound objectives, protocols and mechanisms for effective groundwater management for the provision of safe, reliable and sustainable water supplies in the Basin; and

WHEREAS, in accordance with the requirements of Water Code section 10753.2, WMWD published notice in compliance with Government Code section 6066 of a hearing of the Board of Directors of WMWD on whether or not to adopt a resolution of intention to draft a groundwater management plan for the Basin; and

WHEREAS, the Board of Directors of WMWD conducted and concluded a public hearing on November 19, 2008 on whether or not to adopt a resolution of intention to draft a groundwater management plan for the Basin.

NOW, THEREFORE, be it resolved by the Board of Directors of the Western Municipal Water District as follows:

Section 1. All of the foregoing Recitals are true and correct and the Board so finds and determines. The Recitals set forth above are incorporated herein and made an operative part of this Resolution.

Section 2. The Board hereby adopts this Resolution of Intention to draft a groundwater management plan for the Arlington Groundwater Basin in accordance with the provisions of Water Code section 10750 et seq.

ADOPTED this 19th day of November, 2008 by the Board of Directors of the Western Municipal Water District, Riverside County, California.

S. R. "Al" Lopez
President, Board of Directors
November 19, 2008

I HEREBY CERTIFY that the foregoing is a full, true, and correct copy of

Resolution 2570 adopted by the Board of Directors of the Western Municipal Water District at a duly noticed regular meeting held on November 19, 2008.
Charles D. Field, Secretary-Treasurer 1/22, 29

THE PRESS-ENTERPRISE

CLASSIFIED ADVERTISING **PROOF**

Printed by: **Tinajero, Maria**
at: **12:14 pm**
on: **Tuesday, Oct 19, 2010**

Ad #: **10438000**

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Riverside, CA 92501-3878
1-800-880-0345
951-684-1200
951-368-9018 Fax

Account Information

Phone #: (951) 789-5000
Name: WESTERN MWD
Address: 450 ALESSANDRO BLVD
OF RIVERSIDE COUNTY
RIVERSIDE CA 92508

Acct #: 199530
Client:
Placed by: BJ Carroll
Fax #: (951) 780-3837

Ad Information

Classification: Legals
Publications: Press-Enterprise

Start date: **10-21-10**
Stop date: **10-28-10**
Insertions: 2

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Taken by: Tinajero, Maria

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Bill size: 116.00x 5.14 agate lines

Amount due: **$417.60**

Ad Copy:

GROUNDWATER MANAGEMENT PLAN

NOTICE IS HEREBY GIVEN that at 9:30 a.m. on November 3, 2010 at its offices located at 450 Alessandro Boulevard, Riverside, California 92508, the Western Municipal Water District (District) will hold a public hearing on whether or not to adopt a resolution of intention to draft a groundwater management plan for the Arlington Groundwater Basin pursuant to California Water Code section 10750 et seq. for the purposes of implementing the plan and establishing a groundwater management program.

Landowners within the District's service territory and other interested parties are invited to attend the hearing. Draft copies of the proposed resolution of intention to draft a groundwater management plan will be available for review by the public at the hearing or may be obtained in advance of the hearing at the District's offices at 450 Alessandro Boulevard, Riverside, California 92508. Opportunity for public comment and input will be provided at the hearing. In accordance with Water Code section 10753.4(b), landowners and other interested parties who wish to participate in developing the groundwater management plan may do so by attending the hearing and indicating their interest, or by submitting a written request to participate to Fakhri Manghi, 450 Alessandro Boulevard, Riverside, California 92508.

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The public is invited to attend and comment in the process described above. Due to time constraints and to enable multiple persons the opportunity to provide oral comment, each speaker will be limited to three minutes. Written comments may also be submitted to the District for inclusion in the public record. Any person or party challenging this process in court may be limited to raising only those issues raised by that person or party or by someone else at the public hearing described in this notice, or in written correspondence delivered to the District at or prior to the public hearing. Any person unable to attend the public hearing may submit written comments to the Western Municipal Water District, 450 Alessandro Boulevard, Riverside, California 92508. If you have questions regarding this notice or the matter to be heard, please contact Fakhri Manghi at (951) 789-5090.
10/21, 28

MINUTES
REGULAR MEETING OF THE BOARD OF DIRECTORS OF THE
WESTERN MUNICIPAL WATER DISTRICT
OF RIVERSIDE COUNTY

November 3, 2010

CALL TO ORDER / PLEDGE OF ALLEGIANCE

21207 The Regular Meeting of the Board of Directors of Western Municipal Water District was called to order in the District office at 9:34 a.m. and Director Brenda Dennstedt led the Pledge of Allegiance to the flag.

21208 **Directors Present**
President Charles D. Field, Presiding
Brenda Dennstedt, Vice President
Donald D. Galleano, Secretary-Treasurer
S.R. "Al" Lopez
Thomas P. Evans

Others Present
John V. Rossi, General Manager
Paul Rugge, Assistant General Manager/CAO
Jeff Sims, Assistant General Manager/COO
Joe Bernosky, Director of Engineering
Jack Safely, Director of Water Resources
Greg Duecker, Director of Administration
Ray Gomez, Public Affairs Manager
Lonnie Clabaugh, Water Operations Manager
Steve Schultz, Wastewater Operations Manager
Tim Barr, Water Use Efficiency Manager
Kevin Mascaro, Controller
Sonya Bloodworth, Executive Assistant
Jean Perry, Executive Assistant
Karly Gaynor, Water Resources Analyst
Jeff Ferre, Best Best & Krieger
Cathleen Anderson, Accounting & Finance Consultant
Erin Gilhuly, CV Strategies
Ralph Hileman, RAGLM

ORAL COMMUNICATIONS

21209 Any person may address the Board upon any subject within Western's jurisdiction, which is not on the agenda, at this time. However, any non-agenda matter that requires action will be referred to staff for a report and action at a subsequent Board meeting. Any person may also address the Board on any agenda matter at the time that matter is discussed, prior to Board Action.

There were no members of the public who wished to speak during Oral Communications.

M-5998 – Approval of Consent Calendar

21210 It was moved by Director Lopez, seconded by Director Dennstedt to approve the Consent Calendar. Motion carried 5-0. As a result, the following Consent Calendar Items were approved:

A) Approve Directors Requests for Compensation.
B) Consider Approval of Regular Board Meeting Minutes, September 1, 2010, September 15, 2010 and October 6, 2010.
C) Receive & File Investment Report – September, 2010
Receive & File Government Code Section 53065.5 Disclosure Report – September, 2010

- END OF CONSENT CALENDAR –

M-5999 – Items to be added to the Agenda

21211 Legal Counsel Jeff Ferre and General Manager John Rossi recommended that the following item be added to the agenda as Action Agenda Item B:

B) Consideration and possible action to act on a request from the Yorba Linda Water District for an Amicus Letter of Support regarding its petition for review before the California Supreme Court.

It was explained that this request from the Yorba Linda Water District was received by the District after the posting of the agenda and that the requested action would need to be taken before November 8, which is before the next Board meeting. As a result, this would qualify as an item which could be added to the agenda under Government Code Section 54954.2(b)(2) since there is a need to take action and the need for action came to the attention of the District subsequent to the posting of the agenda. A motion was made by Director Lopez, seconded by Director Dennstedt to add the following as Action Agenda Item: B) Consideration and possible action to act on a request from the Yorba Linda Water District for an Amicus Letter of Support regarding its petition for review before the California Supreme Court. The motion passed 5-0.

M-5999 – Conduct a Public Hearing Regarding Intention to Draft a Groundwater Management Plan for the Arlington Groundwater Basin; and Consider Adoption of Resolution 2694.

21212 President Field announced that it was the time and place for the Public Hearing on Proposed Resolution 2694 which is a Resolution of Intention to draft a groundwater management plan for the Arlington Groundwater Basin. He then called upon staff to provide a description of the proposed Resolution of Intention.

General Manager John Rossi explained that the Resolution of Intention will provide for the drafting of a groundwater management plan for the Arlington Groundwater Basin in accordance with the provisions of Water Code section 10750 et seq. In 1992, the

California Legislature passed Assembly Bill (AB) 3030, which was designated to provide local public agencies increased management authority over groundwater resources. Any local public agency which provides water service to all or to a portion of its service area and whose service areas include all or a portion of a groundwater basin may adopt a Groundwater Management Plan (GWMP). The goal of the Arlington Basin GWMP will be determined through a stakeholder process, which will include WMWD. It is anticipated that these goals would relate to ensuring that groundwater remains a reliable and cost-effective water supply to meet current and future municipal, industrial, and agricultural needs.

Legal Counsel Jeff Ferre then informed the audience that notice of this hearing was been given pursuant to the requirements of Water Code Section 10750 et seq. Draft copies of the proposed resolution have been made available for review by the public and are available at this hearing. Landowners and other interested parties who wish to participate in developing the groundwater management plan may do so by attending this hearing and indicating their interest, or by submitting a written request to participate.

Written comments may also be submitted to the District for inclusion in the public record. Any person or party challenging this process in court may be limited to raising only those issues raised by that person or party or by someone else at this hearing, or in written correspondence delivered to the District prior to the close of this hearing. Notice having been provided and published by Staff, it would now be appropriate to conduct the public hearing.

President Field then declared the Public Hearing to be open. President Field stated there being no comments, he declared the Public Hearing to be closed, adding the matter is now before the Board for discussion.

Director Evans requested a list of the largest pumpers that expressed an interest in participating in the Groundwater Management Plan. Staff said that such a report could be provided.

Mr. Safely stated that the next step would be to provide a written groundwater management plan which would identify the activities to keep the basin sustainable looking at production, location of production, recharge, and use of recycled water and increase the yield of the basin through artificial recharge. This would be prepared in a written plan and updated on an annual basis. Director Dennstedt inquired as to how long it would take to complete the draft plan. Mr. Safely stated that the draft should be completed by the end of June 2011. Following the consideration and discussion of this matter by the Board, it was then moved by Director Dennstedt, seconded by Director Lopez to adopt Resolution 2694, to draft a Groundwater Management Plan for the Arlington Groundwater Basin. Motion carried 5-0.

M-6000 – Consideration and Possible Action to Act on a Request from the Yorba Linda Water District for an Amicus Letter of Support Regarding its Petition for Review Before the California Supreme Court

21213 Legal Counsel Jeff Ferre explained that the Yorba Linda Water District (YLWD) is requesting that water districts throughout California file Amicus Letters of Support for its request for a petition of review before the California Supreme Court. ACWA JPIA, Western's insurer, has also advocated for such support. The YLWD is involved in litigation regarding the Freeway Complex Fire of November 2008 and the issue of whether YLWD should be involved in such litigation under the legal cause of action of inverse condemnation. Water districts are immune from liability in such circumstances under the "firefighter immunities" set forth in the Government Code. If water district were to be held liable under the theory of inverse condemnation, this would substantially change the law, potential liabilities, and costs to the water districts and its customers. The Amicus Letter of Support will support YLWD's position and request that the California Supreme Court rule that the theory of inverse condemnation should not apply to water districts. Following discussion by the Board, a motion was made by Director Galleano, seconded by Director Dennstedt to authorize the development and submission of an Amicus Letter of Support. The motion carried 5-0.

SAWPA Report

21214 Director Galleano reported that he attended the SAWPA Commission workshop where Jack Safely made a presentation on the Seven Oaks Dam. He also shared that a presentation was made by Metropolitan Water District regarding potential ways to reduce water use by twenty percent in their service area by the year 2020.

General Counsel Report

21215 General Counsel Jeff Ferre gave a brief update on the newly adopted Propositions 22 and 26 adding that he will continue to update the Board on what fees and charges may be impacted and on any additional approvals and procedures that may be required as a result of the adoption of Proposition 26.

MWD Report

21216 Director Evans proposed that Western implement a rolling calendar to project reports and actions throughout the year. Staff indicated that such a calendar could be provided. Director Evans also reported that progress continues on negotiations with Metropolitan and its employee's regarding wages and benefits.

WRCOG Report

21217 Director Lopez reported on recent discussions at the WRCOG meeting and shared that a presentation was made honoring Mayor Loveridge for his years of service representing the National League of Cities.

Directors Reports

21218 Director Evans gave an update on the MWD Inspection trips and there was discussion regarding the importance of keeping supporters engaged.

General Manager and Staff Report

21219 General Manager John Rossi reported on the following:

- Introduced Water Use Efficiency Manager Tim Barr who provided a power point presentation regarding the status of Western's Water Use Efficiency Programs and the potential for water savings in tank-less water heaters.
- Assistant General Manager/CAO Paul Rugge introduced Director of Administration Greg Duecker who presented an Information Technology Master Plan Program status update.
- Updated the Board on the Headquarters move plan stating that the first Regular Board Meeting at the new Headquarters facility will be held on December 1st.
- Shared that the City Council Land Use Planning Committee will be meeting tomorrow at 3:00 p.m. in regards to Western Municipal Water District providing sewer service in a portion of the Woodcrest area.
- Provided a power point presentation regarding the Board's adopted rate resolution on May 19, 2010.
- Shared that Western Municipal Water District has been nominated for the Association of California Water Agencies (ACWA) Outreach Award for the State.

Adjourn

21220 There being no further business to come before the Board, at 11:14 a.m. President Field adjourned the Regular Board meeting.

CHARLES D. FIELD
President

DONALD D. GALLEANO
Secretary-Treasurer

THE PRESS-ENTERPRISE

CLASSIFIED ADVERTISING RECEIPT

Printed by: **Gribbin, Kristin**
at: **10:45 am**
on: **Friday, Feb 04, 2011**

Ad #: **10547259**

3450 Fourteenth St.
Riverside, CA 92501-3878
1-800-880-0345
951-684-1200
951-368-9018 Fax

Payment Information

Date	Payment #	Type	Card Holder	Exp.	Approval	Amount
					Total payments:	$ 0.00

Note: Advertising may be subject to credit approval.

Gross price:	$ 568.80
Net price:	$ 568.80
Total payments:	$ 0.00
Amount Due:	**$ 568.80**

Account Information

Phone #: (951) 789-5000
Name: WESTERN MWD
Address: OF RIVERSIDE COUNTY
14205 MERIDIAN PARKWAY
RIVERSIDE CA 92518

Acct #: 199530
Client:
Placed by: BJ Carroll
Fax #: (951) 780-3837

Ad Information

Classification: Legals
Publications: Press-Enterprise

Start date: **02-08-11**
Stop date: **02-15-11**
Insertions: 2

Rate code: LE-Open
Ad type: Ad Liner
Taken by: Gribbin, Kristin

Size: 2x78.790
Bill size: 158.00x 5.14 agate lines

Ad Copy:

RESOLUTION 2694

RESOLUTION OF INTENTION OF THE BOARD OF DIRECTORS OF THE WESTERN MUNICIPAL WATER DISTRICT TO DRAFT A GROUNDWATER MANAGEMENT PLAN FOR THE ARLINGTON GROUNDWATER BASIN

WHEREAS, the Western Municipal Water District ("WMWD") was formed by the voters in 1954 for the purpose of importing water supplies from the Metropolitan Water District of Southern California; and

WHEREAS, WMWD is a local public water agency as defined by Water Code section 10752(g) that provides water service within its service area and is thus authorized pursuant to Water Code section 10750 et seq. to prepare, adopt and implement a groundwater management plan within all or a portion of WMWD's service area; and

WHEREAS, WMWD's service area includes all or a portion of the Arlington Groundwater Basin ("Basin"), which Basin is not subject to groundwater management pursuant to other provisions of law or a court order, judgment or decree; and

WHEREAS, the preparation and adoption of a groundwater management plan for the Basin pursuant to Water Code section 10750 et seq. will help identify sound objectives, protocols and mechanisms for effective groundwater management for the provision of safe, reliable and sustainable water supplies in the Basin; and

WHEREAS, in accordance with the requirements of Water Code section 10753.2, WMWD published notice in compliance with Government Code section 6066 of a hearing of the Board of Directors of WMWD on whether or not to adopt a resolution of intention to draft a groundwater management plan for the Basin; and

WHEREAS, the Board of Directors of WMWD conducted and concluded a public hearing on November 03, 2010 on whether or not to adopt a resolution of intention to draft a groundwater management plan for the Basin.

NOW, THEREFORE, be it resolved by the Board of Directors of the Western Municipal Water District as follows:

Section 1. All of the foregoing Recitals are true and correct and the Board so finds and determines. The Recitals set forth above are incorporated herein and made an operative part of this Resolution.

Section 2. The Board hereby adopts this Resolution of Intention to draft a groundwater management plan for the Arlington Groundwater Basin in accordance with the provisions of Water Code section 10750 et seq.

ADOPTED this 3rd day of November, 2010, by the Board of Directors of the Western Municipal Water District, Riverside County, California.

/S/ CHARLES D. FIELD
President, Board of Directors

November 3, 2010

I HEREBY CERTIFY that the foregoing is a full, true, and correct copy of Resolution 2694 adopted by the Board of Directors of the Western Municipal Water District at a duly noticed regular meeting held on November 3, 2010.

/S/ DONALD D. GALLEANO
Secretary-Treasurer
2/8, 15

Printed at: 9:21 am	
on: Monday, Oct 1, 2012	
Ad #: 0000901017	
Order Taker: Maria Tinajero	

enterprisemedia

Classified Advertising

Proof

3450 Fourteenth St.
Riverside, CA 92501-3878
(800) 514-7253
(951) 684-1200
(951) 368-9006 Fax

Account Information

Phone #:	(951) 571-7100
Name:	WESTERN MWD OF RIVERSI
Address:	14205 MERIDIAN PKWY , RIVERSIDE, CA 92518 USA
Account #	100143045
Client:	
Placed By:	Ines Contreras
Fax #:	(951) 571-0590

Ad Information

Classification:	EN CLS Legals
Publication:	PE.com, Press Enterprise
Start Date:	10/03/2012
Stop Date:	10/10/2012
Insertions:	2 print / 2 online
Rate code:	LGL PE Any
Ad type:	CLS 10 Liner
Size:	2.0 X 79 Li
Bill Size:	
Amount Due:	**$565.20**

Ad Copy:

GROUNDWATER MANAGEMENT PLAN

NOTICE IS HEREBY GIVEN that at 9:30 a.m. on October 17, 2012, or as soon thereafter as practicable, at its offices located at 14205 Meridian Parkway, Riverside, California 92518, the Western Municipal Water District ("District") will hold a public hearing as part of the regularly scheduled meeting of the Board of Directors to determine whether or not to adopt a groundwater management plan for the Arlington Groundwater Basin ("Basin") pursuant to California Water Code section 10750 et seq. for the purposes of implementing the Plan and establishing a groundwater management program. The District has released the final version of the Arlington Basin Groundwater Management Plan ("Plan") for public review. A copy of the proposed Plan, and any maps that may be prepared, can be accessed online at www.wmwd.com or may be obtained for the cost of reproduction at the District's offices at the address set forth above. Draft copies of the proposed resolution adopting the Plan will be available for review by the public at the hearing or may be obtained in advance of the hearing at the District's offices.

The Plan provides information on current and projected groundwater conditions in the Basin and develops a management framework to meet a goal of operating the Basin in a sustainable manner for a reliable supply for beneficial uses. This goal is supported by four basin management objectives that utilize quantitative and qualitative measures to track progress towards meeting the overall goal. Implementation of the Plan will be done in coordination with the participants in the development of the Plan.

Landowners within the District's service territory and other interested parties are invited to attend the hearing. Opportunity for public comment and input will be provided at the hearing. In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this public hearing, please contact Jean Perry at (951) 571-7224. Notification forty-eight (48) hours prior to the hearing will enable the District to make reasonable arrangements to ensure accessibility to the hearing.

The public is invited to attend and comment during the public hearing. Due to time constraints and to enable multiple persons the opportunity to provide oral comment, each speaker will be limited to the customary five minutes. Protests to the adoption of the Plan will be heard, and written protests may be filed. Written protests to the Plan may be filed by landowners affected by the Plan. The protests must include the landowner's signature and a description of his/her land. Written comments may also be submitted to the District for inclusion in the public record. Any protests by landowners in the area covered by the Plan must comply with the requirements set forth in California Water Code Section 10753.6 and be provided to the District in writing prior to the close of the public hearing. Any person or party challenging this process in court may be limited to raising only those issues raised by that person or party or by someone else at the public hearing described in this notice, or in written correspondence delivered to the District at or prior to the public hearing. Any person unable to attend the public hearing may submit written comments to the District at the District's address as set forth above. If you have questions regarding this notice or the matter to be heard, please contact Fakhri Manghi at (951) 571-7290. 10/3, 10/10

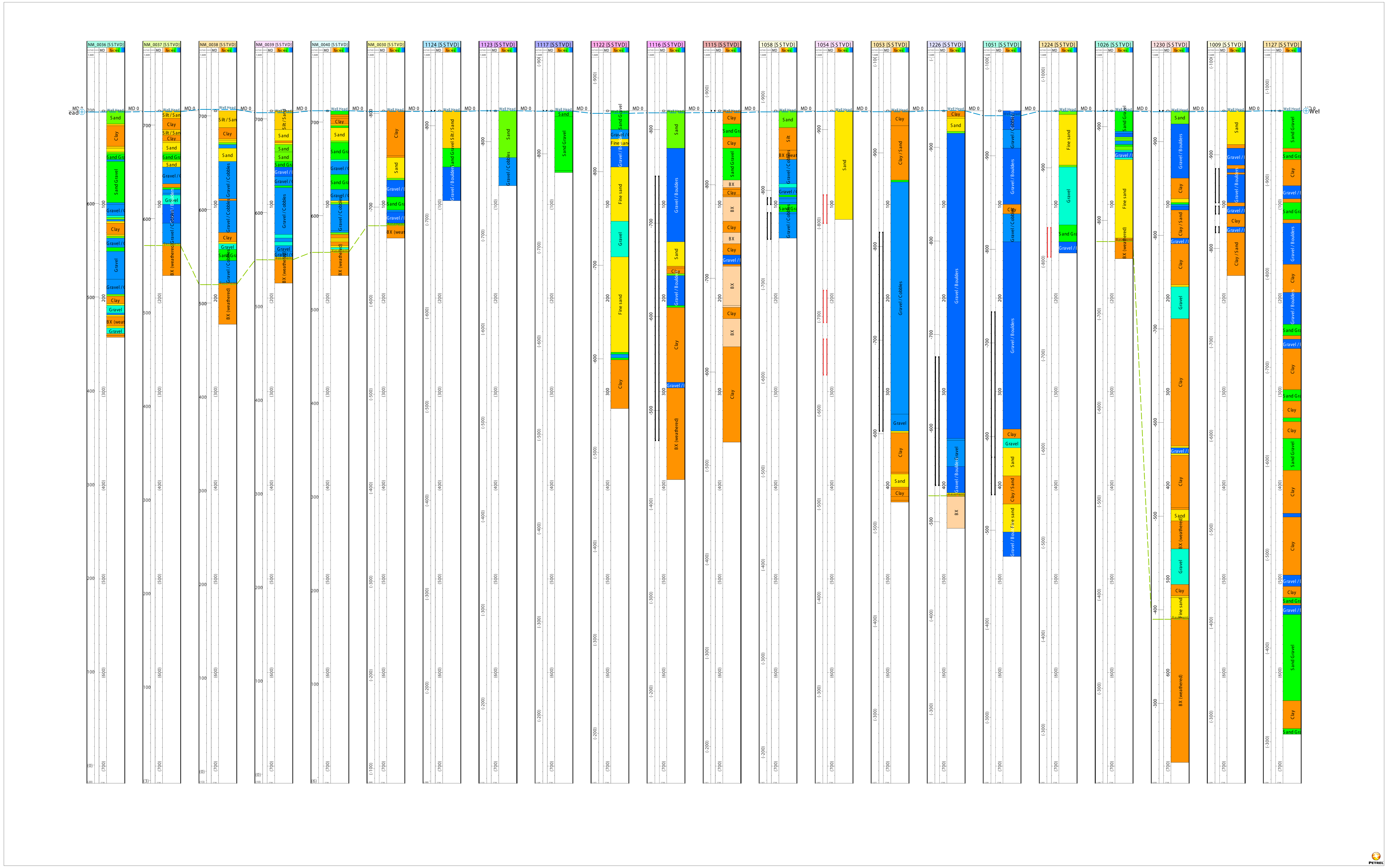
APPENDIX B – GEOLOGIC CROSS-SECTIONS

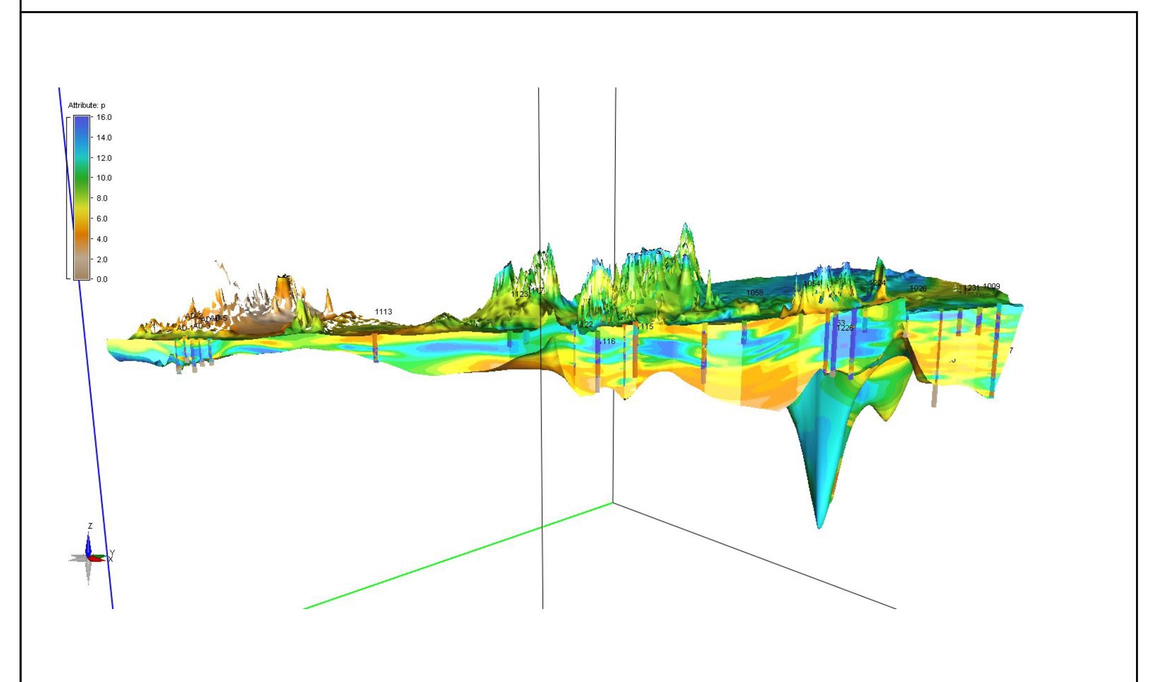
Western Municipal Water District

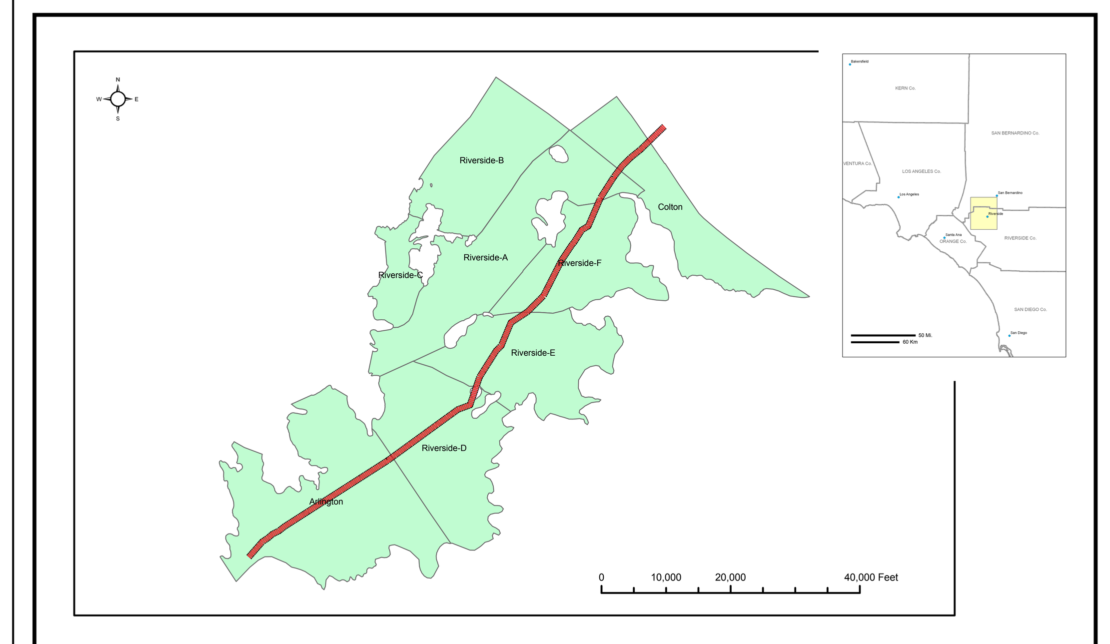
Geologic cross-sections and 3D lithologic model, Riverside and Arlington Basins

Lithologic Cross - Section A-A'

Figure 1







LEGEND

LITHOLOGY

- gravel (p = 16)
- sand
- silt
- clay
- weathered bedrock
- bedrock (p = 2)

DRAFT COPY

Notes:
- SSTVD is Sub-sea True Vertical Depth.
- MD = Measured Drill Depth
- Vertical Exaggeration 10X

WESTERN MUNICIPAL WATER DISTRICT

Western Municipal Water District

Geologic cross-sections and 3D lithologic model, Riverside and Arlington Basins

Lithologic cross - section F-F'

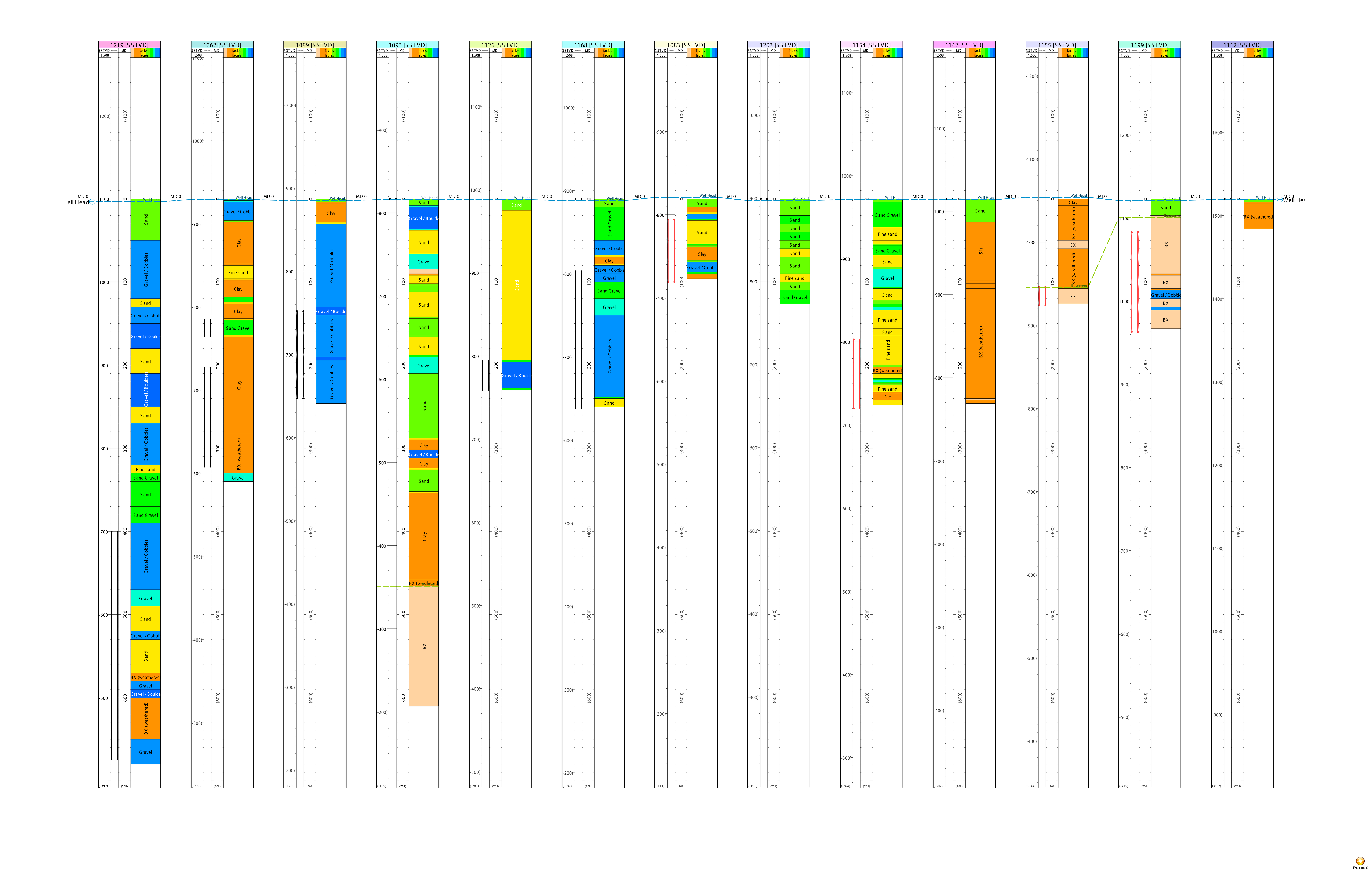
Prepared by:

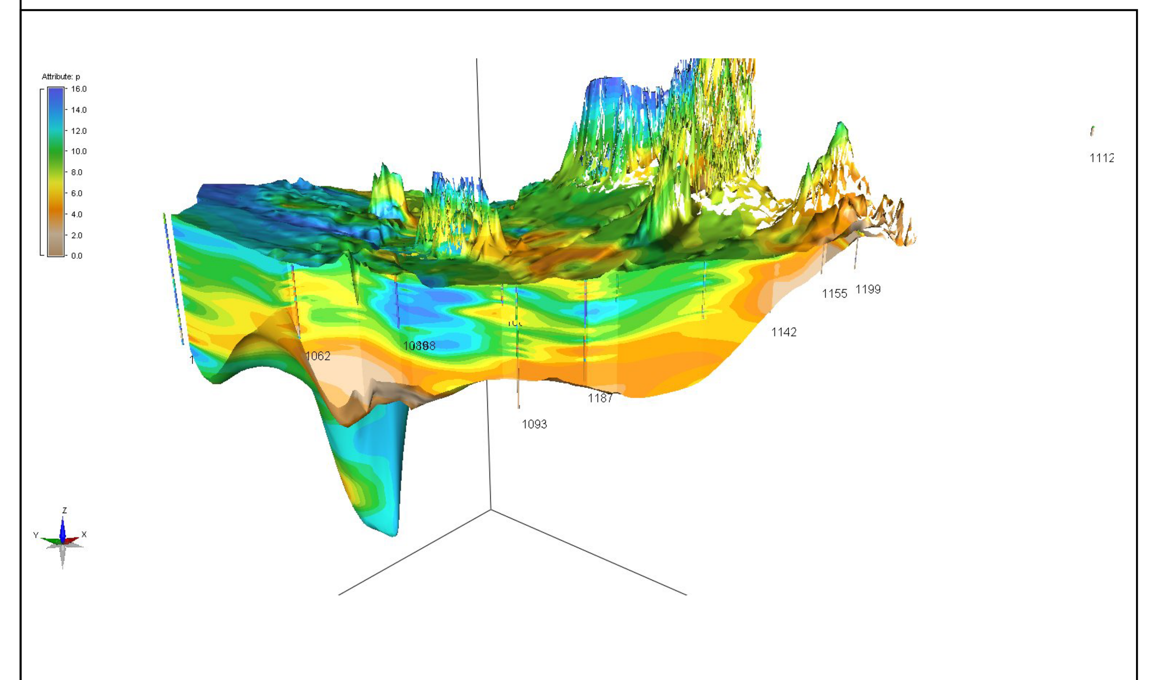
Numeric Solutions LLC
Geoinformation Management
www.numericsolutions.com

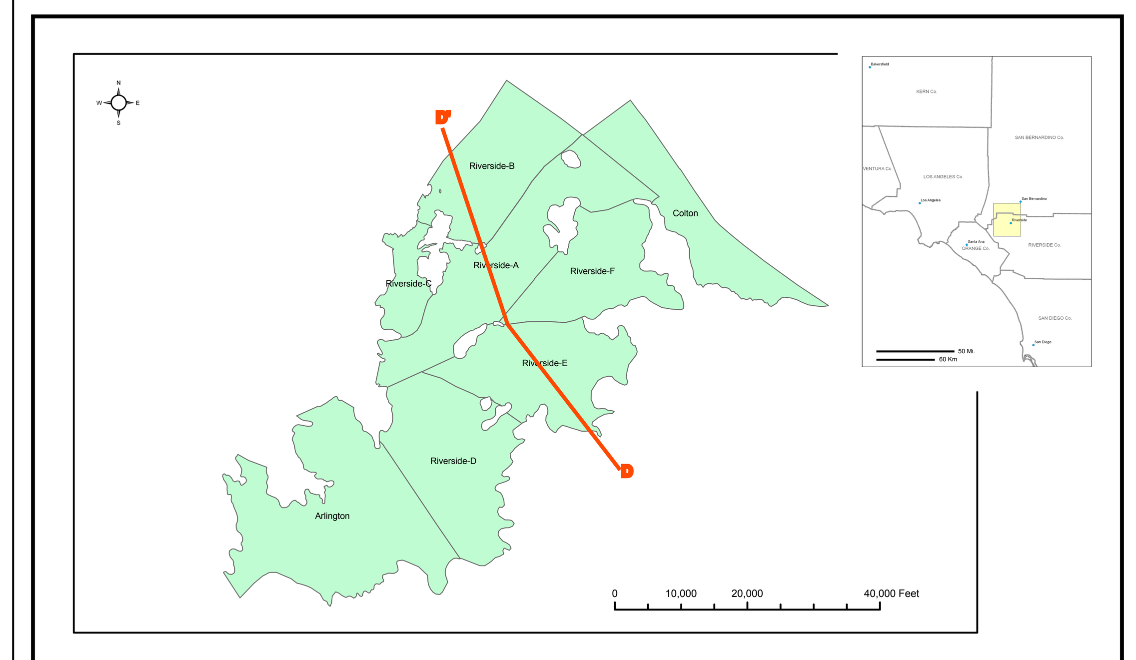
Western Municipal Water District

Geologic cross-sections and 3D lithologic model, Riverside and Arlington Basins

Lithologic Cross - Section D-D'
Figure 4







LEGEND

LITHOLOGY

- gravel (p = 16)
- sand
- silt
- clay
- weathered bedrock
- bedrock (p = 2)

DRAFT COPY

Notes:
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- Vertical Exaggeration 10X

Western Municipal Water District

Geologic cross-sections and 3D lithologic model, Riverside and Arlington Basins

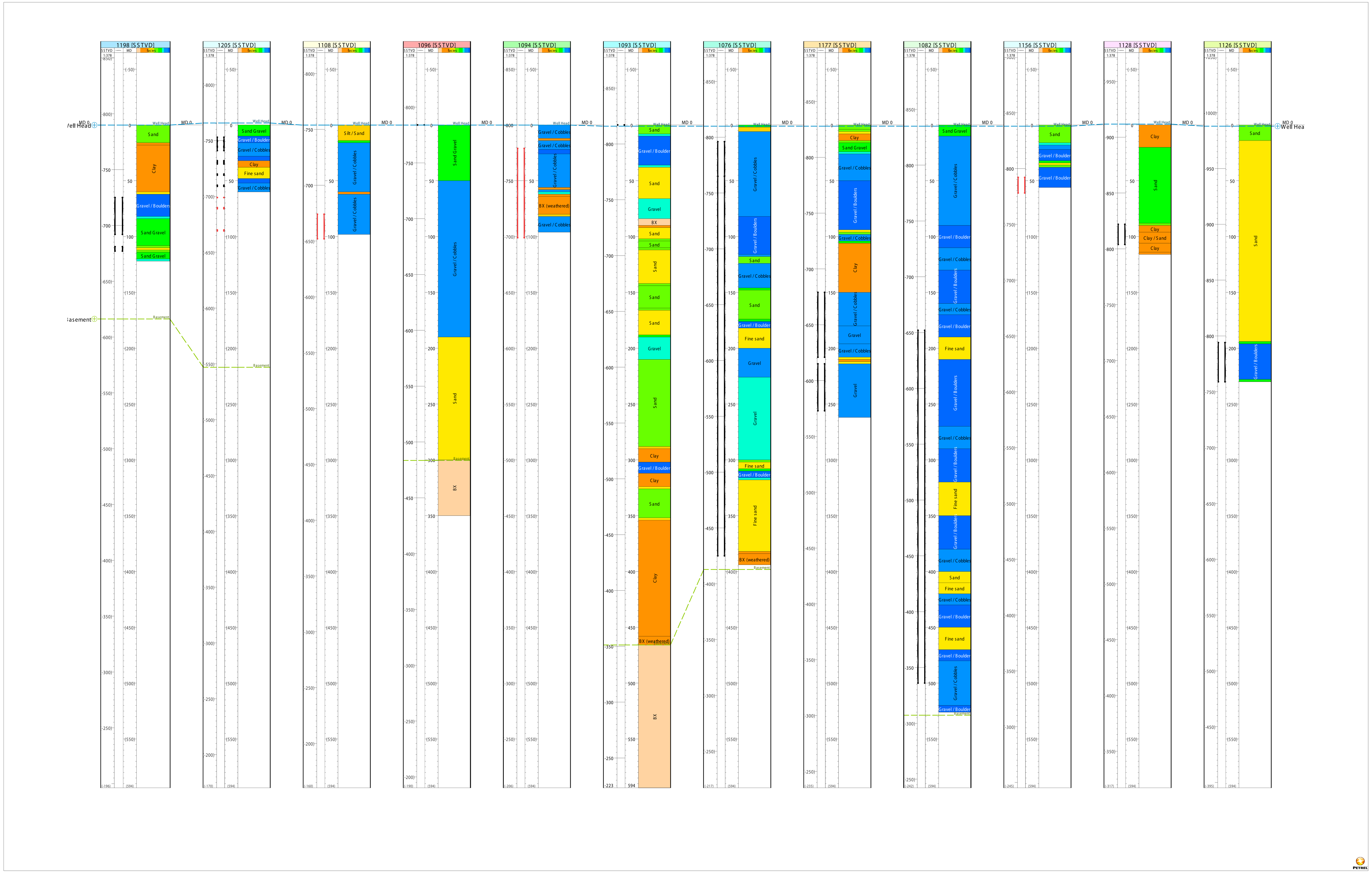
Lithologic cross - section F-F'

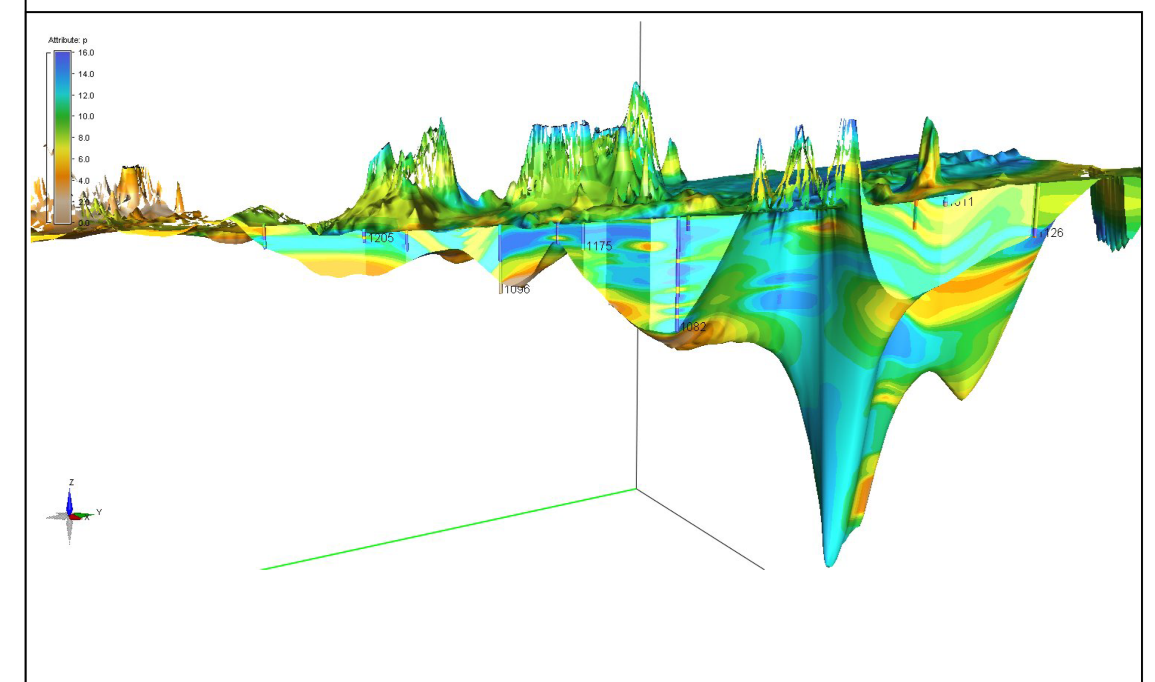
Prepared by:
Numeric Solutions LLC

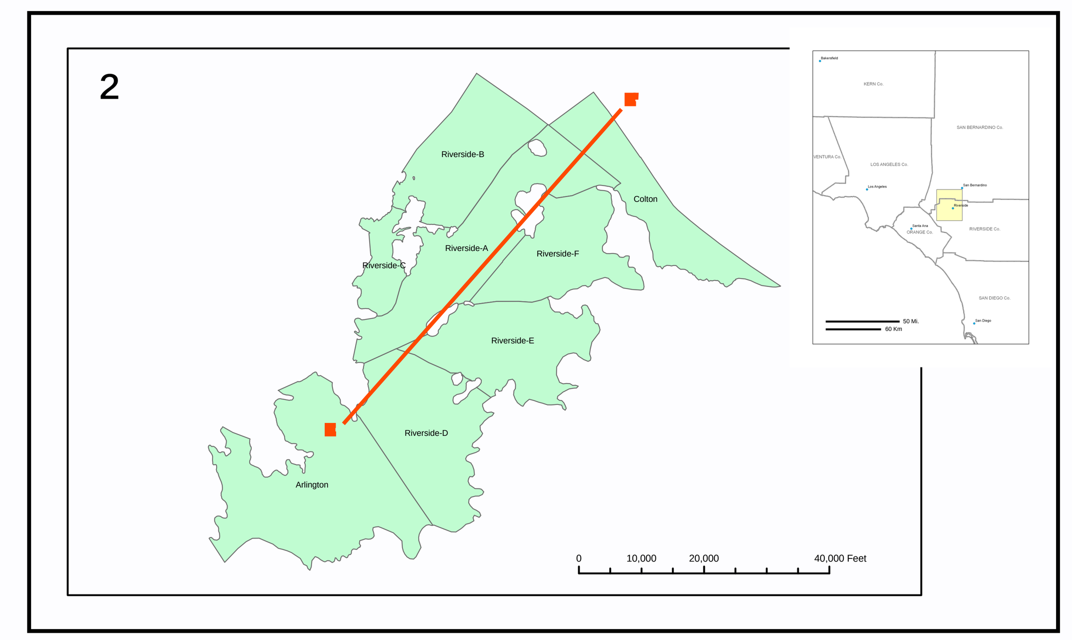
Western Municipal Water District

Geologic cross-sections and 3D lithologic model, Riverside and Arlington Basins

Lithologic Cross - Section E-E'
Figure 6







LEGEND

LITHOLOGY
- gravel (p = 16)
- sand
- silt
- clay
- weathered bedrock
- bedrock (p = 2)

DRAFT COPY

Notes:
- SSTVD is Sub-sea True Vertical Depth.
- MD = Measured Drill Depth
- Vertical Exaggeration 10X

WESTERN MUNICIPAL WATER DISTRICT

Western Municipal Water District

Geologic cross-sections and 3D lithologic model, Riverside and Arlington Basins

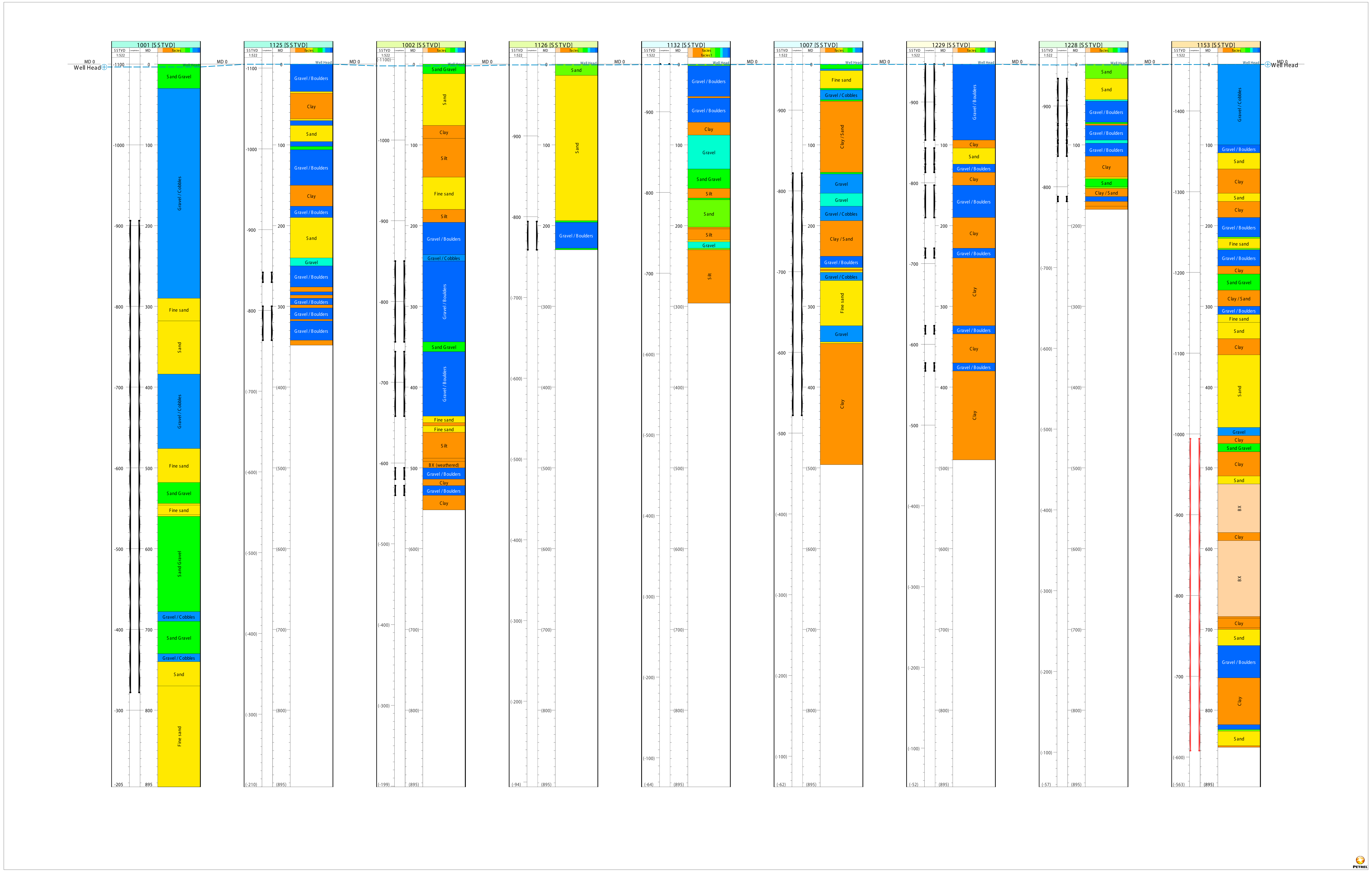
Lithologic cross - section F-F'

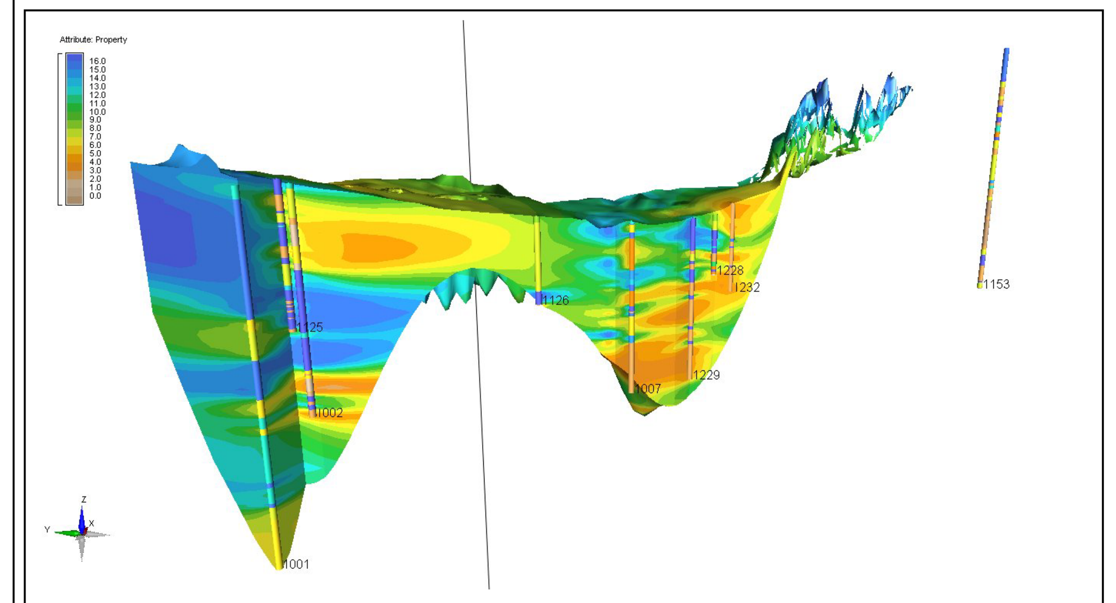
Prepared by:
Numeric Solutions LLC

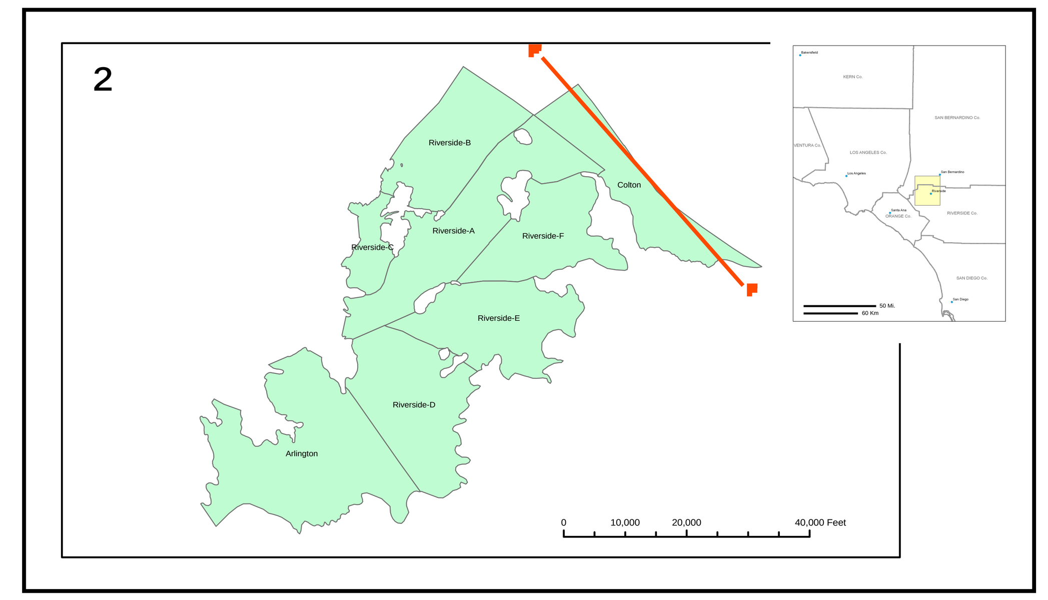
Western Municipal Water District

Geologic cross-sections and 3D lithologic model, Riverside and Arlington Basins

Lithologic Cross - Section F-F'
Figure 7







LEGEND
LITHOLOGY
- gravel (p = 16)
- sand
- silt
- clay
- weathered bedrock
- bedrock (p = 2)

DRAFT COPY

Notes:
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- MD = Measured Drill Depth
- Vertical Exaggeration 10X

Western Municipal Water District
Geologic cross-sections and 3D lithologic model, Riverside and Arlington Basins
Lithologic cross - section F-F'

Prepared by: Numeric Solutions LLC

APPENDIX C – CONSUMER CONFIDENCE REPORTS

CORONA

Department of Water and Power

"Protecting Public Health"

Consumer Confidence Report

2010

For the year 2009

Message from the General Manager

Once again, I am pleased to report that the City of Corona's Department of Water and Power consistently provided high quality drinking water that has met or surpassed the standards set by State and Federal Law. Providing clean and safe drinking water to our customers is of the utmost importance. As our customer, you are entitled to know where your water comes from and what it contains.

This Consumer Confidence Report was created to provide customers with important information about the quality of their drinking water. As a requirement of the California Department of Public Health (CDPH), all of our customers will receive a copy of this report which contains a summary about the various sources of water we use and its quality in comparison to CDPH's standards.

It is our mission to "Protect Public Health" and provide you with the highest quality product and service. We are always looking for new, better and more efficient ways to increase the quality and reliability of our water supply.

The Department of Water and Power successfully produces quality water by blending different water sources to produce the highest quality of water possible. It is our mission to "Protect Public Health" and provide you with the highest quality product and service. We are always looking for new, better and more efficient ways to increase the quality and reliability of our water supply.

This report is a reflection upon our ability to meet health standards. Although informative, it is not your only means of obtaining information with regard to the water we deliver. I encourage you to contact me if you should have questions regarding this report or require more detailed information.

It is our commitment to you that we will always provide you with the best that we can offer.

Jonathan Daly
DWP General Manager
951-736-2477

Informed Customers

Last year, as in years past, your tap water met all United States Environmental Protection Agency (USEPA) and State drinking water health standards. The City of Corona safeguards its water supplies and we are proud to report that our system has not violated a maximum contaminant level.

This report is a snapshot of the water quality in 2009. Included are details about where your water comes from, what it contains, and how it compares to the State's standard. We are committed to providing you with information because informed customers are our best allies.

Corona's Water Sources

In 2009, Corona residents and businesses used approximately 14 billion gallons of drinking water. Fifty-six percent of that water was pumped from groundwater wells owned and operated by the City of Corona. Another 34% came from the Colorado River by way of Lake Mathews. The final 10% is State Project water from Northern California, by way of the California Aqueduct.

Water Treatment

The water from the Colorado River requires treatment to remove and inactivate harmful organisms. This process is accomplished using the City's two surface water treatment facilities; Sierra Del Oro and Lester Water Treatment Plants. These facilities incorporate the use of coagulants in conjunction with multimedia filtration and disinfection. In independent laboratory testing, 100% of the samples taken in 2009 were free of harmful organisms.

About half of the groundwater pumped in Corona is sent to a state-of-the-art reverse osmosis membrane treatment facility, the Temescal Desalter. This facility incorporates nitrate and Total Dissolved Solids (TDS) removal and also provides disinfection. This valuable treated water is later used at most of our blending facilities to lower the other groundwater sources' nitrate and TDS levels, ensuring a safe reliable source of drinking water to your tap.

The City disinfects the distribution system with mono chloramines (a ratio of chlorine and ammonia). This allows us to achieve a long lasting residual and reduce the production of disinfection by-products.

Blending

In 2009, the City put a state-of-the-art blending and pumping facility, known as the Garretson Blend Station, online. This facility blends most of the additional water not treated at the Temescal Desalter into a two-million gallon reservoir, providing another layer of protection to the drinking water system.

You will notice in the tables of detected contaminants that the groundwater exceeds the primary standard for copper, nitrate, and perchlorate. The unregulated contaminant boron exceeded the notification level. The City of Corona is required by law to report the highest level detected in the SOURCES of water and then the AVERAGE concentration delivered to your tap. The averages are much lower because the City of Corona blends water from several sources to meet water quality standards and an ever increasing demand. The blending stations are continuously monitored and routinely sampled to ensure that the water delivered to your tap meets all health standards with a safety margin of more than 10%.

Unregulated contaminant monitoring helps the USEPA and CDPH determine where certain contaminants occur and whether the contaminants need to be regulated.

For more information about fluoridation, oral health, and current issues visit: **www.cdph.ca.gov/certlic/drinkingwater/pages/fluoridation.aspx**.

Recycled Water

Most people take it for granted that there will always be enough water. Every time we turn on the tap or a sprinkler, water flows without interruption. The reality for California is that there is not enough water for everyone. The State and our own region are dealing with a growing population, stricter environmental constraints on how water is used and periodic droughts that will curtail unlimited use of our water supplies.

To save drinking water sources for other uses, the City of Corona has constructed an extensive recycled water distribution system. It produces high quality recycled water that has been filtered and disinfected by the City's own water reclamation facilities and is used for landscaping and irrigation. It allows the City to save current potable (drinking) water supplies for homes and businesses.

In the past year, the City of Corona has made substantial progress with its recycled water project, which began serving recycled water to customers in the summer of 2006. We currently have 188 connections using approximately four-million gallons per day with many new sites in the process of being converted. This amount also includes the gallons per day used at the City's water reclamation facilities for landscaping, washing, cleaning, and general utility use.

The City of Corona's infrastructure for the recycled water system consists of approximately 29 miles of pipeline, three storage reservoirs, and three pump stations. Recycled water has its own system of pipelines that is completely separate from drinking water lines. These pipelines are painted purple to easily distinguish them from potable water systems.

The recycled water system produced 1,389 million gallons of recycled water in 2009. Soon, most parks and schools in Corona will be using this source of water to irrigate all landscape areas. During 2009, five schools, four parks, 21 Landscape Maintenance Districts, eight agricultural customers, and three industrial customers were converted to recycled water. In addition, the street sweeping contractor for the City is now using recycled water. These new conversions are using an additional 164 million gallons of recycled water per year. In June of 2009, the City of Corona connected the first dual plumbed building to recycled water. It will be using recycled water for toilet and urinal flushing as well as drain trap priming. This site will also use recycled water for landscape irrigation. These efforts have and will continue to significantly reduce the use of potable water.

Conservation – The Time is Now

Water is essential to all life on this planet. Water provides the backbone to the California economy, keeps families healthy and provides for our excellent quality of life. Water is one of our most valuable resources, but it is in limited supply. The planet contains only 3% of water suitable for drinking and two-thirds of this is stored in ice caps and glaciers. It is essential that we all do our part to ensure the availability of this vital resource for the future.

Corona receives water from three main sources: groundwater, the State Water Project (SWP), and the Colorado River. The two imported water sources, SWP and Colorado River, are affected by many issues that the state of California is struggling to deal with. California's water crisis in turn affects Corona's water supply. Restrictions and limitations on the supply of imported water drive costs up for this scarce resource and jeopardize reliability.

Approximately 10% of Corona's water comes from the SWP. This water is transported to Southern California from the Delta in Northern California through the California State Aqueduct. The State has experienced a drought for the past three years. Many major reservoirs have been at historic lows. Recent rains have helped improve conditions, however issues affecting the Delta will not be resolved easily or in the near future. In addition to the drought, a 2008 court decision restricted pumping from the Delta in Northern California to help protect the endangered Delta Smelt. The Delta Smelt is a small fish that is believed to play an important role in the health of the Delta. Other restrictions have also been enacted to protect the Chinook Salmon. As a result of these factors, allocations of water from the SWP have been reduced dramatically – agencies were only allocated 40% of the water they requested in 2009.

The Colorado River supplies approximately 34% of Corona's water. Water from the Colorado River is being distributed to California along with six other states and Mexico, and comes to Corona via Lake Mathews. California has traditionally taken its share of allocated water plus 50% of declared surpluses for many years. However, increased population growth in the six other states has all but eliminated the surplus. In addition, the Colorado River is in the midst of a nine year drought, further reducing supplies.

The City's largest water source is groundwater, which is nearly 56% of the total water supply. Groundwater is pumped up from the natural underground aquifer through a well system and sent to a water treatment plant for distribution. The City owns and operates a state-of-the-art reverse osmosis water treatment system that filters out groundwater impurities. Groundwater is replenished by rain water. Without significant rainfall to increase our groundwater levels, this resource will become scarce as pumping levels exceed water returned by rainfall.

These three water sources are blended to bring high quality, clean drinking water to your home or business. Continued conservation efforts are needed, however, due to the issues that affect the State's water supply. The Corona Department of Water and Power is here to help customers conserve our valuable resource with programs that include free landscape audits, free water conservation devices and rebates towards the purchase of water efficient appliances. To view more information on these and other programs offered through the Corona Department of Water and Power, please visit our website at www.discovercorona.com or contact one of our Water Resource Technicians at 951-736-2234 or by e-mail at StopTheDrop@discovercorona.com.

2009 Comprehensive Water Package

In November 2009, in an extraordinary session, the California Legislature passed the Delta Water Package, a comprehensive legislative package on water policy. The package was subsequently signed into law by Governor Arnold Schwarzenegger. The package includes four policy bills, all with the commitment to the co-equal goals of water supply reliability and ecosystem restoration, and a $11.14 billion bond, referred to as the Safe, Clean and Reliable Drinking Water Supply Act of 2010.

The four bills tackle California's water issues on several fronts. These include establishing a Delta Governance/Delta Plan to address the health of the Sacramento Delta, which southern Californians rely on for their drinking water, changes to groundwater monitoring policies, mandated statewide water conservation targets, and changes to water diversion and use funding. As part of the package of bills, Senate Bill No. 7 requires all urban water agencies to reduce statewide per capita water consumption 20% by 2020. There is also an interim target of 10% that must be met by December 31, 2015.

The statewide per capita water use reduction target of 20% by 2020 is an important goal that we all must work towards achieving. The Corona Department of Water and Power has many conservation programs available for customers to help save water and meet this goal. Contact our Water Resources Team at 951-736-2234 or e-mail them at StopTheDrop@discovercorona.com for more information.

Drought Ordinance – Stage 2 in Effect

In January 2009, the Corona City Council adopted Ordinance No. 2962 (the "Drought Ordinance") to help reduce the quantity of water used and provide rules and regulations on the use of water. This action was in direct response to the Governor of California's proclamation of statewide drought conditions on June 4, 2008. Conditions have worsened due to the continuing drought and recent court decisions restricting the amount of water from the Delta region.

Corona entered Stage 2 of the Drought Ordinance on July 31, 2009. Stage 2 means that there is a "Minimum Water Shortage." Everyone needs to reduce water consumption by 10%. In Stage 2, the following rules are in effect:

- No watering is permitted between the hours of 10 a.m. and 8 p.m.
- Allowing water to runoff property is prohibited.
- Leaks and broken sprinklers must be fixed in a timely manner.
- Using water to wash down hard surfaces, such as sidewalks, driveways, parking areas, tennis courts, patios or other covered areas, is prohibited.
- Sprinklers are limited to 20 minute run times per station.
- Odd numbered addresses can water only on Saturday, Monday and Wednesday.
- Even numbered addresses can only water on Sunday, Tuesday and Thursday.
- Watering on Fridays is prohibited; however a government agency may water three days per week of the agency's choosing, but only between the hours of 8 p.m. and 10 a.m.
- Washing vehicles is permitted with a hand-held bucket and automatic shut-off hose nozzle.
- Food establishments are prohibited from providing drinking water to patrons unless requested.

Tiered Rates and Water Budgets

In 2009, the City of Corona Department of Water and Power introduced its new Tiered Rate and Water Budget program. The goal of this new program is to promote efficient water use and resource conservation, and to provide fair rates. It helps provide an equitable way to share resources by giving each customer a budget based on their unique characteristics. All Department of Water and Power customers receive a water budget under the new program.

Residential customers receive a water budget that has two components: an indoor budget and an outdoor budget. The indoor budget provides 60 gallons per person per day in the billing cycle, based on the number of people in the home. The default indoor budget for a single family home is four people per household, and two people for each unit in a multi-family residence. The outdoor budget is based on daily weather data and the amount of irrigated area. The outdoor budget will decrease during cooler months and increase in warmer summer months, because it is using weather data to determine how much water needs to be applied.

Commercial and industrial accounts receive a budget based on a three-year rolling average. For accounts that have not been established for more than a year, the budget would equal actual use in the first year. Landscapes with a designated meter receive an outdoor budget based on irrigable area and weather data, just like residential accounts.

The Corona Department of Water and Power has a variance program to make changes to the water budget if the number of people in the residence is greater than the default budget or if the irrigable area estimate is not correct. Forms are available online at www.discovercorona.com, at City Hall, or can be mailed to you by calling 951-736-2407. Water conservation programs are also available to help customers stay within their water budget. Call our Water Resources Team at 951-736-2234 for more information.

Did you know?

- There are 748 gallons of water in one unit of water
- One acre-foot of water equals 325,829 gallons or 435.6 units
- One acre-foot of water can supply two typical families with water for a whole year
- A leaky toilet can waste between 30 to 500 gallons of water per day

Street Banner Program

In an effort to raise awareness about the Drought Ordinance and the need to conserve water, the City of Corona Department of Water and Power began a street banner program. Since the beginning of the program in 2009, 224 banners have been installed throughout the City on street light poles.

The street banners in this program include messages about activities for Stage 2 of Corona's Drought Ordinance, including:

- No watering between 10 a.m. and 8 p.m.
- Repair all water leaks and sprinklers
- No washing down driveways and sidewalks
- Water should not run off your property

Weather-Based Irrigation Controller Pilot Program

The City of Corona Department of Water and Power received a grant in the amount of $30,000 from the Bureau of Reclamation to fund a pilot program to install 37 Weather-Based Irrigation Controllers, or WBICs, at residences in Corona. WBICs use daily weather data, soil information and sprinkler type to efficiently apply water to landscaping. In the first six months since the controllers have been installed, the pilot program has resulted in a savings of 15.7 acre-feet of water.

Turf Removal Projects

In 2009, the City of Corona Department of Water and Power removed 37,410 square feet of turf at nine of its water and water reclamation facilities throughout the City. Removing turf, especially in areas where turf is not being used, such as in parkways and narrow pathways, makes sense and is a great way to save water. The water-hungry turf was replaced with 1,475 water-friendly, native California plants. Over-head spray irrigation was converted to more efficient bubbler systems.

By utilizing efficient irrigation and water-friendly plants at these nine facilities, the Department estimates it will save 5.7 acre-feet of water each year. That equates to 1,857,225 gallons of potable water saved each year. The turf removal projects not only illustrate how beautiful water-friendly plants can be but also underscore the Department's commitment to the efficient use of water.

Did you know that what goes down your drain may end up in the natural water course?

While water reclamation treatment removes most pollutants, even trace amounts of some substances may be harmful to the environment. The best solution is to prevent pollution from going down the drain in the first place.

- **Dispose of unwanted medicine properly… No Drugs Down the Drain!**
  For years, it was recommended to flush unwanted medicine down the drain to protect children and pets from accessing it, and to ensure against illegal recovery of controlled substances. Today, there are better options. The City of Corona Department of Water and Power and the Police Department are working together to protect our environment from the harmful effects of improperly discarded unused medications. For your convenience, a pharmaceutical disposal bin has been placed at the Corona Police Department lobby located at 730 Corporation Yard Way. For more information, please call 951-736-2330.

- **Keep drains free of cooking fats, oils and grease.**
  When flushed down the drain, cooking fats, oils and grease, or "FOG", can block sewer lines, causing raw sewage to back up into your home or into neighborhood streets and storm drains. Overflows can pose health and environmental hazards. Keep your sewer lines FOG-free by scraping cooking fats into the garbage or into your food scrap recycling bin, where available – not down the drain.

General Water Quality Information

The sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

- Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application and septic systems.
- Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the USEPA and the California Department of Public Health prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. Department regulations also establish limits for contaminants in bottled water that provide the same protection for public health.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the **USEPA's Safe Drinking Water Hotline at 800-426-4791.**

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about their drinking water from their health care providers. USEPA/Center for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the **Safe Drinking Water Hotline at 800-426-4791.**

Nitrates

Nitrate in drinking water at levels above 45 parts per million (mg/L) is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 45 parts per million (mg/L) may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or are pregnant, you should ask advice from your health care provider.

Lead and Copper Rule Monitoring

The California Department of Public Health, the USEPA, and the City of Corona Department of Water and Power are concerned about lead and copper in your drinking water.

In 2008, we completed one round of lead and copper sampling in compliance with the California Safe Drinking Water Act. We are pleased to report these results did not exceed the 90th percentile action levels of 1.3 parts per million (ppm) for copper and 15 parts per billion (ppb) for lead. The result was 0.1 ppm for copper and 2.1 ppb for lead. We are continuing to monitor for lead and copper to further our commitment to the protection of public health.

Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Corona Department of Water and Power is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

UCMR2

In 2007, EPA revised the Unregulated Contaminant Monitoring Rule to establish a new set of unregulated contaminants. The City of Corona Department of Water and Power collected data from December 2008 to November 2009. Minimum reporting levels are as stipulated in the Federal UCMR 2. List 1 – Assessment Monitoring consists of 10 chemical contaminants for which standard analytical methods were used. List 2 – Screening Survey consists of 15 contaminants for which new analytical methods were used. All analyses were conducted by contract laboratories.

Source Water Assessment

The Drinking Water Source Assessment and Protection Plan was last updated July 2008. This information is available through the City of Corona City Clerk's office, or by using the online Public Records Request form at www.discovercorona.com.

Primary Standards – Mandatory Health-Related Standards

CLARITY

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR		Range Average	State Project Water	Colorado River Water	Major Sources in Drinking Water
Combined Filter Effluent Turbidity (a)	NTU %	0.3 95(a)	NA	–	Metropolitan Water District Henry J. Mills Water Treatment Plant	Highest	0.18	–	Soil runoff
						% < 0.3	100%	–	
Combined Filter Effluent Turbidity (a)	NTU %	0.3 95 (a)	NA	–	City of Corona, Lester & Sierra Del Oro Water Treatment Plants	Highest	–	0.07	Soil runoff
						% < 0.3	–	100%	

MICROBIOLOGICAL CONTAMINANTS

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR		Range Average	Ground Water	Colorado River Water	Major Sources in Drinking Water
Total Coliform Bacteria (b)	%	5.0 (b)	(0)	–	Combined Distribution System: 0-1.3	Range	0.0-0.2	–	Naturally present in the environment
					Combined Distribution System: 0.4	Average	0	–	
Fecal Coliform and E. coli (c)	(c)	(c)	(0)	–	Distribution System Wide fecal coliform positive samples = 0		–	–	Human and animal fecal waste
					Distribution System Wide E.coli positive samples = 0		–	–	
Turbidity (a)	TT		NA	–	Distribution System Wide: ND-2.2	Range	–	–	Soil runoff
					Distribution System Wide: 0.1	Average	–	–	
Heterotrophic Plate Count	CFU/ mL	TT	NA	–	Distribution System Wide: ND-250	Range	TT	–	Naturally present in the environment
					Distribution System Wide: 2	Average	TT	–	

Key to Abbreviations

AL .... Regulatory Action Level
DLR .... Detection Limit for Purposes of Reporting
MCL .... Maximum Contaminant Level
PHG .... Public Health Goal
MCLG .... Maximum Contaminant Level Goal
MRDL .... Maximum Residual Disinfectant Level
MRDLG .... Maximum Residual Disinfectant Level Goal
MFL .... Million fibers per liter
NA .... Not Applicable
NC .... Not Collected
ND .... Not Detected, ND is considered "0"
NL .... Regulatory Notification Level
NS .... No Standard
umho/cm .... Micromho per centimeter
NTU .... Nephelometric Turbidity Units
pCi/L .... PicoCuries per liter
ppm .... Parts per million or milligrams per liter (mg/L)
ppb .... Parts per billion or micrograms per liter (µg/L)
ppt .... Parts per trillion or nanograms per liter
ppq .... Parts per quadrillion or picograms per liter
GPM .... Gallons per minute
MG .... Million Gallons
TT .... Treatment Technique
µS/cm .... MicroSiemen per centimeter

RADIOACTIVE CONTAMINANTS [Groundwater analyzed every four years for four consecutive quarters]

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR	Range Average	Ground Water	State Project Water	Colorado River Water	Major Sources in Drinking Water
Gross Alpha Particle Activity (d) (h)	pCi/L	15	(0)	3	High	16.2	5.5	9.4	Erosion of natural deposits
					Low	1.2	ND	4.2	
					Average	6.1	ND	5.7	
Uranium	pCi/L	20	0.43	1	High	1.6	2.8	3.8	Erosion of natural deposits
					Low	1.4	1.5	3.2	
					Average	1.5	2.1	3.5	

Extended Abbreviations

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste and appearance of drinking water.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Primary Drinking Water Standard (PDWS): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Regulatory Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

INORGANIC CONTAMINANTS

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR	Range Average	Ground Water	State Project Water	Colorado River Water	Major Sources in Drinking Water
Arsenic	ppb	10	0.004	2	High	3.9	3.4	3.1	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
					Low	ND	ND	2.3	
					Average	0.32	2.6	2.6	
Barium	ppm	1	2	0.1	High	0.14	ND	0.15	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits
					Low	ND	ND	0.14	
					Average	0.02	ND	0.14	
Chromium	ppb	50	(100)	10	High	13	ND	ND	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
					Low	ND	ND	ND	
					Average	6.3	ND	ND	
Copper (d)	ppm	AL = 1.3	0.3	0.05	High	7.1	ND	ND	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
					Low	ND	ND	ND	
					Average	0.6	ND	ND	
Fluoride	ppm	2	1	0.1	High	1.5	0.9	0.4	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
					Low	0.2	0.5	0.3	
					Average	0.4	0.7	0.3	

Water is one of our most valuable resources, but is in limited supply. The planet contains only 3% of water suitable for drinking and two-thirds of this is stored in ice caps and glaciers.

INORGANIC CONTAMINANTS, continued

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR	Range Average	Ground Water	State Project Water	Colorado River Water	Major Sources in Drinking Water
Nitrate (d) (f)	ppm	45 (as NO3)	45 (as NO3)	2	High	110	3.6	1.8	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
					Low	ND	ND	ND	
					Average	36.2	2.7	0.09	
Nitrite	ppm	1 (as nitrogen)	1 (as nitrogen)	0.4	High	0.11	ND	ND	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
					Low	ND	ND	ND	
					Average	ND	ND	ND	
Perchlorate (d)	ppb	6	6	4	High	14	ND	1.5	Perchlorate is an inorganic chemical used in solid rocket propellant, fireworks, explosives, flares, matches, and a variety of industries. It usually gets into drinking water as a result of environmental contamination from historic aerospace or other industrial operations that used or use, store, or dispose of perchlorate and its salts
					Low	ND	ND	1.0	
					Average	3.4	ND	1.4	
Selenium	ppb	50	(50)	5	High	8.7	ND	ND	Discharges from petroleum, glass, and metal refineries; erosion of natural deposits; discharge from mines and chemical manufacturers; runoff from livestock lots (feed additive)
					Low	ND	ND	ND	
					Average	1.2	ND	ND	

It is essential that we all do our part to ensure the availability of this vital resource for the future.

SYNTHETIC ORGANIC CONTAMINANTS including Pesticides/PCBs

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR	Range Average	Ground Water	State Project Water	Colorado River Water	Major Sources in Drinking Water
Dibromochloro-propane (DBCP)	ppt	200	1.7	10	High	41	ND	ND	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit
					Low	ND	ND	ND	
					Average	2	ND	ND	

VOLATILE ORGANIC CONTAMINANTS

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR	Range Average	Ground Water	State Project Water	Colorado River Water	Major Sources in Drinking Water
1,2-Dichloropropane	ppb	5	0.5	0.5	High	4.4	ND	ND	Discharge from industrial chemical factories; primary component of some fumigants
					Low	ND	ND	ND	
					Average	0.18	ND	ND	
Tetrachloroethylene (PCE)	ppb	5	0.06	0.5	High	0.95	ND	ND	Discharge from factories, dry cleaners and auto shops (metal degreaser)
					Low	ND	ND	ND	
					Average	0.09	ND	ND	
Trichloroethylene (TCE)	ppb	5	1.7	0.5	High	2.8	ND	ND	Discharge from metal degreasing sites and other factories
					Low	ND	ND	ND	
					Average	1.1	ND	ND	

Secondary Standards – Aesthetic Standards

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR	Range Average	Ground Water	State Project Water	Colorado River Water	Major Sources in Drinking Water
Chloride	mg/L	500	NA	NA	High	220	99	100	Runoff/leaching from natural deposits; seawater influence
					Low	26	67	90	
					Average	134	85	97	
Color	Units	15	NA	NA	High	3	2	4	Naturally-occurring organic materials
					Low	ND	1	2	
					Average	0.13	2	3	
Copper	mg/l	1	0.17	0.05	High	0.007	ND	ND	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
					Low	0.005	ND	ND	
					Average	0.001	ND	ND	
Foaming Agents (MBAS)	ug/L	500	NA	NA	High	60	ND	60	Municipal and industrial waste discharges
					Low	ND	ND	60	
					Average	3	ND	60	
Manganese (d) (e)	ug/L	50	NL=500	20	High	950	ND	ND	Leaching from natural deposits
					Low	ND	ND	ND	
					Average	233	ND	ND	
Specific Conductance (d)	µS/cm	1600	NA	NA	High	1800	670	1100	Substances that form ions when in water; seawater influence
					Low	680	460	1000	
					Average	1254	590	1000	

SECONDARY STANDARDS – Aesthetic Standards, continued

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR	Range Average	Ground Water	State Project Water	Colorado River Water	Major Sources in Drinking Water
Sulfate	mg/L	500	NA	0.5	High	340	77	260	Runoff/leaching from natural deposits; industrial wastes
					Low	130	32	250	
					Average	207	68	260	
Total Dissolved Solids (d)	mg/L	1000	NA	NA	High	1200	380	660	Runoff/leaching from natural deposits
					Low	450	250	630	
					Average	774	330	660	
Turbidity	Units	5	NA	NA	High	0.44	0.08	1.7	Soil runoff
					Low	ND	0.05	0.25	
					Average	0.02	0.06	0.94	

FEDERAL UNREGULATED CONTAMINANTS MONITORING RULE (UCMR2) – List 2 - Screening Survey

PARAMETER	Units	State or Federal MCL [MRDL]	PHG (MCLG) [MRDLG]	State DLR	Range Average	Treatment Plant Effluent		Major Sources in Drinking Water
						Distribution System	State Project Water	
N-Nitrosodiethylamine (NDEA)	ppb	NA	NA	0.005	Range	ND-0.085	ND	By-product of drinking water chloramination; industrial processes
					Average	0.0012	ND	
N-Nitrosodimethylamine (NDMA)	ppb	NA	NA	0.002	Range	ND-0.021	ND - 0.01	By-product of drinking water chloramination; industrial processes
					Average	0.00006	0.004	

DISINFECTION BY-PRODUCTS, DISINFECTANT RESIDUALS, AND DISINFECTION BY-PRODUCT PRECURSORS FEDERAL RULE

PARAMETER	UNIT	State MCL	PHG (MCLG) [MRDLG]	State DLR	Low High Avg	Dist. System Wide City RAA	Major Sources in Drinking Water	Health Effects Language
Total Trihalomethanes TTHM	ppb	80	N/A	1	Range	ND-38.3	By-product of drinking water disinfection	Some people who use water containing trihalomethanes in excess of the MCL over many years may experience liver problems, kidney, or central nervous system problems, and may have an increased risk of getting cancer
					Highest RAA	16.6		
Halocetic Acids	ppb	60	N/A	1	Range	ND-25	By-product of drinking water disinfection	Some people who drink water containing halocetic acids in excess of the MCL over many years may have an increased risk of getting cancer
					Highest RAA	13.6		
(Mills - WR-24 Conn.) Bromate (d) (g)	ppb	10	0.1	5	Range	3.9-12	By-product of drinking water disinfection	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer
					Highest RAA	8		
Total Chlorine Residual	ppm	[MRDLG 4 as Cl2]	[MRDLG 4 as Cl2]	N/A	Range	ND-2.9	Drinking water disinfectant added for treatment	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort
					Highest RAA	1.46		
Control of DBP Precursors (TOC)	ppm	TT	N/A	0.3	Low	2.1-2.5	Various natural and man made sources	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of cancer
					Avg	2.3		

UNREGULATED CHEMICALS REQUIRING MONITORING (STATE AND FEDERAL)

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR	Range Average	Ground Water	State Project Water	Colorado River Water
Boron	ppb	NL=1,000	NA	100	Range	350-4500	110-180	120-140
					Average	1000	150	130
Chromium VI	ppb	NA	NA	1	Range	ND-2	0.05-0.46	ND-0.03
					Average	ND	0.35	ND
Vanadium	ppb	NL=50	NA	3	Range	ND-12	5.7-6.8	ND
					Average	6.9	6.3	ND

OTHER PARAMETERS THAT MUST BE INCLUDED IN THE CCR

PARAMETER	Units	State MCL	PHG (MCLG)	State DLR	Range Average	Ground Water	State Project Water	Colorado River Water
Sodium	ppm	NA	NA	NA	Range	43-150	54-82	97-100
					Average	96.6	73	100
Hardness	ppm	NA	NA	NA	Range	210-620	87-130	300-310
					Average	392	120	310
Alkalinity	ppm	NA	NA	NA	Range	43-180	69-95	130-140
					Average	103	83	130
Calcium	ppm	NA	NA	NA	Range	67-160	17-30	73-76
					Average	110.7	26	75
Magnesium	ppm	NA	NA	NA	Range	11-60	9.0-15	29-30
					Average	28.1	12	30
pH	pH Units	NA	NA	NA	Range	5.5-7.9	8.3-8.5	8.1-8.4
					Average	7.3	8.4	8.2
Bicarbonate	ppm	NS	NA	–	Range	130-390	–	–
					Average	256	–	–
Potassium	ppm	NA	NA	NA	Range	1.4-11	2.4-3.5	5.0-5.2
					Average	4.1	2.9	5.1

FOOTNOTES

(a) The turbidity level of the filtered water shall be less than or equal to 0.3 NTU in 95% of the measurements taken each month and shall not exceed 1.0 NTU at any time. Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system. The monthly average and range of turbidity are listed in the Secondary Standards section.

(b) Total coliform MCLs: No more than 5.0% of the monthly samples may be total coliform positive. Compliance is based on the combined distribution system sampling from all the filtration plants. A total of 1,584 samples were collected in 2009 and seven tested positive for total coliform. The MCL was not violated.

(c) Fecal coliform / E.coli MCLs: The occurrence of 2 consecutive total coliform positive samples, one of which contains fecal coliform/E. coli, constitutes an acute MCL violation. The MCL was not violated in 2009.

(d) This constituent was detected at high levels exceeding the MCL at the highlighted source. Please note that this water is blended with water from other sources to provide you with the highest quality drinking water.

(e) The high concentration of Manganese is from a single groundwater well of many that the City utilizes. Thus, the flow weighted average was used as a better representation of the Manganese concentration in the overall water supply.

(f) State MCL is 45 mg/L as nitrate, which is the equivalent to 10 mg/L as N.

(g) Bromate levels reported are from the Metropolitan Water District's (MWD) Mills Filtration Plant. Corona Water Plants do not ozonate water. Mills Water is blended with other sources. MWD Bromate compliance began in October 2003 and the values are based on weekly samples.

(h) Data collected from four consecutive quarters of monitoring in 2008.

Espanol: Este informe contiene informacíon muy importante sobre su agua de beber. Tradúzcalo ó hable con alguien que lo entienda bien.

If you are interested in participating in decisions that affect the quality and supply of the water in the City of Corona, or for general information about this report and questions related to water quality, please call 951-736-2236.

Regular City Council meetings are held on the first and third Wednesday of every month.

Frequently Asked Questions

I am installing a new dishwasher and/or water softener. How hard is my water?

Hardness is dissolved calcium and magnesium which may cause a deposit on fixtures and dishes. Our average hardness is 392 ppm or 22.9 grains per gallon, hard to very hard. Our water can change depending on the water demand and the season.

When I turn on my kitchen or bathroom faucet, the water comes out white. What is wrong?

Dissolved air in the water causes a milky appearance. When you open your faucet to pour a glass of water, the pressure is relieved and this allows the air to form bubbles that rise to the top of the glass. It will clear within a minute, beginning at the bottom of the glass.

I was told to flush my water heater and I don't know how to do it. Can you help?

We have general instructions for flushing your water heater. To obtain a copy please call 951-736-2234 and we will be happy to mail, fax or e-mail them to you.

Why is there water flowing from fire hydrants into the street?

The Corona Department of Water and Power is focused on water conservation to secure this precious resource for the future. Water flushing is a best management practice that helps to maintain water quality in the entire water distribution system, therefore protecting all of the water within the system. The flushing is also part of the hydrant maintenance program. This program includes exercising the hydrant valve to ensure that there is sufficient fire flow protection. Most fire hydrant laterals sit idle all year long without water flowing through them, which can lead to stagnant water and water quality issues. Therefore, the Corona Department of Water and Power has developed a routine hydrant flushing and maintenance program as part of our ongoing water quality assurance program. Please call 951-736-2234 for more information.

Where can I get information on how to conserve water?

Call us! The best way to get information on water conservation for your home or business is to call our office and talk to our Water Resources Team. Please call us at 951-736-2234. Our website also has a lot of good conservation tips and rebate information to help you conserve water. Please visit www.discovercorona.com for more information or e-mail StopTheDrop@discovercorona.com.

City of Corona
Department of Water and Power
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Water Quality Report 2009

An important message about drinking water sources from the USEPA

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of land or through the ground, it dissolves naturally occurring minerals, and in some cases radioactive materials, and can pick up substances resulting from the presence of animals or human activity. Contaminants that may be present in source water include:

Microbial Contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic Contaminants, such as salts and metals, that can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and Herbicides, which may come from a variety of sources, such as agriculture, urban stormwater runoff, and residential uses.

Organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production and can also come from gas stations, urban storm water runoff, agricultural application, and septic systems.

Radioactive Contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

Regulations: In order to ensure that tap water is safe to drink, U.S. Environmental Protection Agency and the California Department of Public Health (CDPH) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. Department regulations also establish limits for contaminants in bottled water that must provide the same protection for public health.

Important Health Information: Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly people, and infants, can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hot Line. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline at 1(800) 426-4791.

Water Sources: Riverside's water is groundwater from wells in the Bunker Hill Basin and Riverside Basin. RPU and other water agencies completed a source–water assessment study for Bunker Hill Basin in San Bernardino in October 2002 and the Riverside Basin in 2000. The source water assessment reports were submitted to the CDPH. Copies are available at Riverside Public Utilities, Water Resources.

This report contains important information about your drinking water. Translate it or speak with someone who understands it.

SPANISH

Este reporte contiene información muy importante sobre su agua potable. Tradúzcalo ó hable con alguien que lo entienda bien. Para más información por favor llame (951) 782-0330.

CHINESE

此份有关你的食水报告,内有重要资料和讯息,请找他人为你翻译及解释清楚。

JAPANESE

この情報は重要です。
翻訳を依頼してください。

TAGALOG

Mahalaga ang impormasyong ito.
Mangyaring ipasalin ito.

VIETNAMESE

Chi tiết này thật quan trọng.
Xin nhờ người dịch cho quý vị.

KOREAN

이 안내는 매우 중요합니다.
본인을 위해 번역인을 사용하십시요.

RIVERSIDE PUBLIC UTILITIES 2009 WATER QUALITY REPORT

PRIMARY STANDARDS: MANDATORY HEALTH-RELATED STANDARDS

CONTAMINANT	STATE MCL	STATE PHG	RIVERSIDE PUBLIC UTILITIES AVERAGE	RANGE	SOURCES IN DRINKING WATER
MICROBIOLOGICAL					
Total Coliform (P/A) (a)	5%	0%	0%	0 - 0.6%	Naturally present in environment
CLARITY					
Turbidity	0.5 NTU	NS	0.1 NTU	<0.1 - 0.4 NTU	Naturally present in environment
REGULATED ORGANIC					
Total Trihalomethanes "TTHMs"	80 ppb	NS	8 ppb	ND - 13 ppb	By-product of drinking water disinfection
Halocetic Acids "HAA5"	60 ppb	NS	ND	ND - 1.7 ppb	By-product of drinking water chlorination
Chlorine	4 ppm	4 ppm	0.5 ppm	ND - 1.2 ppm	Drinking water disinfectant added for treatment
Control of DBP precursors Total Organic Carbon "TOC"	Treatment Requirement	NS	1.6 ppm	ND - 2.3 ppm	Various natural and man-made sources
Dibromochloropropane "DBCP"	200 ppt	1.7 ppt	ND	ND - 20 ppt	Banned nemotacide still present due to past agricultural activities
REGULATED INORGANIC					
Arsenic	10 ppb	4 ppt	ND	ND - 2 ppb	Erosion of natural deposits
Fluoride	2 ppm	1.0 ppm	0.5 ppm	0.5 ppm	Naturally present in environment
Nitrate (NO_3)	45 ppm	45 ppm	25 ppm	21 - 30 ppm	Naturally present in environment
Perchlorate	6 ppb	6 ppb	ND	ND	Inorganic chemical used in variety of industrial operations.
RADIOLOGICAL					
Gross Alpha	15 pCi/L	NS	8 pCi/L	<3-17 pCi/L	Erosion of natural deposits
Uranium	20 pCi/L	0.5 pCi/L	11 pCi/L	7 - 21 pCi/L	Erosion of natural deposits
LEAD/COPPER (AL) (90% Household Tap)					
Copper (b)	1,300 ppb	170 ppb	380 ppb	<50 - 750 ppb	Internal corrosion of home plumbing
ADDITIONAL MONITORING					
Radon	NS	NS	129 pCi/L	129 pCi/L	Naturally present in environment

REGULATED CONTAMINANTS WITH NO MCLS	NOTIFICATION LEVEL	STATE PHG OR MCLG	RIVERSIDE AVERAGE	RANGE
Chromium VI	NS	NS	2.0 ppb	1.6 - 2.3 ppb
Vanadium	NL 50 ppb	NS	7 ppb	6 - 7 ppb
Boron	NL 1000 ppb	NS	130 ppb	100 - 160 ppb

SECONDARY STANDARDS
AESTHETIC STANDARDS

	STATE MCL	RIVERSIDE PUBLIC UTILITIES AVERAGE	RIVERSIDE PUBLIC UTILITIES RANGE	SOURCES IN DRINKING WATER
Odor Threshold	3	1	1 - 2	Naturally present in environment
Chloride	500 ppm	34 ppm	31 - 36 ppm	Naturally present in environment
Sulfate	500 ppm	72 ppm	64 - 78 ppm	Naturally present in environment
Total Dissolved Solids "TDS"	1,000 ppm	387 ppm	314 - 458 ppm	Naturally present in environment
Specific Conductance	1,600 μmho	624	593 - 655	Substances form ions in water
Corrosivity	Noncorrosive	0.4	0.1 - 0.7	Natural or industrially influenced balance of hydrogen, carbon, and oxygen in the water; affected by temperature and other factors
pH Units	NS	7.7 units	7.3 - 8.4 units	Naturally present in environment
Hardness ($CaCO_3$)	NS	228 ppm (12 gpg)	223 - 232 ppm	Naturally present in environment
Alkalinity ($CaCO_3$)	NS	172 ppm	165 - 180 ppm	Naturally present in environment
Sodium	NS	42 ppm	40 - 43 ppm	Naturally present in environment
Calcium	NS	72 ppm	71 - 73 ppm	Naturally present in environment
Potassium	NS	3 ppm	3 - 4 ppm	Naturally present in environment
Magnesium	NS	12 ppm	11 - 12 ppm	Naturally present in environment

Monitoring Report 2009

Riverside Public Utilities tests for more than 200 possible contaminants in our water system. This report provides data from sampling conducted in calendar year 2009. Only those contaminants detected in our water system are listed here. For a listing of additional chemical tests, please contact Water Quality Manager Adam Ly at (951) 351-6331.

Water Resources

Riverside met all of its water supply needs by utilizing groundwater sources located in the San Bernardino, Bunker Hill, and Riverside Basins.

Water Compliance & Monitoring Program

In 2009, we collected more than 17,700 water samples to test for a variety of potential contaminants. Samples were collected at water sources, along transmission pipelines, throughout the distribution system, including reservoirs and booster stations, and treatment plants to ensure water quality from its source to your meter.

The Utility uses state certified independent laboratories to perform water tests. This ensures that an independent set of experts test your water from the source to your meter. Last year, we spent more than $700,000 on compliance laboratory costs.

Riverside Public Utilities 2009 Water Sampling Data

8,105 - Samples collected to test for bacteria.

3,792 - Samples collected for source and system compliance and monitoring.

5,806 - Samples collected for treatment plant compliance and monitoring.

17,703 - Total samples collected.

We are pleased to report that our water met or surpassed all state and federal drinking water quality standards in 2009. We welcome you to attend our Board of Public Utilities meetings at 3901 Orange Street, in Riverside, held at 8:30 a.m. on the first and third Fridays of each month. You can also visit our website at BlueRiverside.com for more information.

Definitions

Maximum Contaminant Level (MCL) The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Maximum Contaminant Level Goal (MCLG) The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the US Environmental Protection Agency (EPA).

Public Health Goal (PHG) The level of a contaminant in drinking water below which there is no known or expected health risk. PHGs are set by the California EPA.

Regulatory Action Level (AL) The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Primary Drinking Water Standard (PDWS) MCLs and MRDL's for contaminants that affect health, along with their monitoring and reporting requirements, and water treatment requirements.

Maximum Residual Disinfectant Level (MRDL) The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG) The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Parts Per Million (ppm) One part per million corresponds to one minute in two years or one penny in $10,000.

Parts Per Billion (ppb) One part per billion corresponds to one minute in 2,000 years or one penny in $10,000,000.

Parts Per Trillion (ppt) One part per trillion corresponds to one minute in two million years or one penny in $10,000,000,000.

Picocuries Per Liter (pCi/L) A measure of the radioactivity in water.

Nephelometric Turbidity Units (NTU) A measure of suspended material in water.

Micromhos (µMHOS) A measure of conductivity (electric current) in water.

NL	Notification level.
ND	Not detected at the detection limit for reporting.
NS	No standard.
GPG	Grains per gallon of hardness (1 gpg = 17.1 ppm).
<	Less than the detectable levels.

(a) Results of all samples collected from the distribution system during any month shall be free of total coliforms in 95 percent or more of the monthly samples.

(b) The Lead and Copper Rule requires that 90 percent of samples taken from drinking water taps in the program homes must be below the action levels. Monitoring is required every 3 years. In 2007, 59 homes participated in the monitoring program. No lead was detected in the samples collected. The next monitoring program is scheduled for 2010.

Additional Regulatory Information

Fluoride - The California Department of Public Health (CDPH) has established an "optimal" fluoride level for water at 1 ppm. Riverside has naturally occurring fluoride levels at 0.5 ppm and is not planning to add fluoride to its water by artificial means.

Lead - If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Riverside Public Utilities is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to two minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to take minimize exposure is available from the Safe Drinking Water Hotline or at www.epa.gov/safewater/lead.

Nitrate - In drinking water at levels above 45 ppm is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of an infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 45 ppm may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant or you are pregnant, you should ask advice about nitrate levels from your health care provider.

Riverside provides drinking water that on average is at 25 ppm and has a range from 21 ppm to 30 ppm during the year. CDPH has set the MCL for nitrate at 45 ppm. Riverside has 52 wells that are blended to comply with drinking water standards. The city conducts extensive monitoring of the blend operations. Seasonal variation in demand and flow, in addition to system maintenance and repair, impact the nitrate levels during the year.

Perchlorate - Perchlorate is a regulated drinking water contaminant in California. The maximum contaminant level for perchlorate is 6 parts per billion. Perchlorate salts were used in solid rocket propellants and other industrial applications.

Radon - Radon is a naturally occurring gas formed from the normal radioactive decay of uranium. It is a colorless, odorless, tasteless, chemically inert, and radioactive gas found virtually everywhere on earth. The USEPA recommends that homeowners take remedial action if the indoor air radon level in their home exceeds 4.0 picocuries. The radon in indoor air attributable to water is minor compared to contributions from the soil, or even the outdoor air. For information on radon, call the National Safe Council's Radon Hotline at 1-800-SOS-RADON.

Monitoring Unregulated Contaminants

This monitoring helps USEPA to determine where certain contaminants occur and whether the contaminants need to be regulated. Data is available at www.epa.gov/ogwdw.

Annual **Drinking Water Quality Report**

2010

Covering the period from January through December 2009, our annual water quality report provides a snapshot of important information about your drinking water. ***Western's water is safe and healthy to drink and meets all water quality standards.*** For those individuals with special health concerns, please refer to page 5.

Note: Industrial and commercial users, including hospitals, medical centers and health clinics, please forward this report to your Environmental Compliance Manager.

Éste informe contiene información muy importante sobre su agua potable. Tradúzcalo o hable con alguien que lo entienda bien. Si desea más informacion, por favor contacte a Public Affairs en Western Municipal Water District, 951.789.5000 or en water@wmwd.com

Securing Your Water Supply

WESTERN MUNICIPAL WATER DISTRICT

Securing Your Water Supply

WESTERN MUNICIPAL WATER DISTRICT
450 E. Alessandro Blvd., Riverside, CA 92508

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Western's Annual Drinking Water Quality Report for 2009 contains a detailed summary of our water quality monitoring and testing.

Western Municipal Water District is pleased to present the report to you, our consumers, and note that our water supply meets all drinking water quality standards. The U.S. EPA and the California Department of Public Health (CDPH) require that all water agencies produce an annual water quality report for customers about their drinking water. Flipping through the pages, you'll find important information about the origin of your water, the composition of your water and the steps we take to protect your health and safety with our water treatment process and water quality monitoring and testing. It's important to know that the production and mailing of this report is mandatory and efforts have been made to keep costs down.

If you have any questions about this report or water quality, please contact our Public Affairs Office at 951.776.4519 or visit us on the web at wmwd.com.

"Western's water is safe and healthy to drink and meets all water quality standards."

Why is There Anything in My Water?

Sources of drinking water (both tap and bottled) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground, it dissolves-naturally occurring minerals, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water due to these activities include:

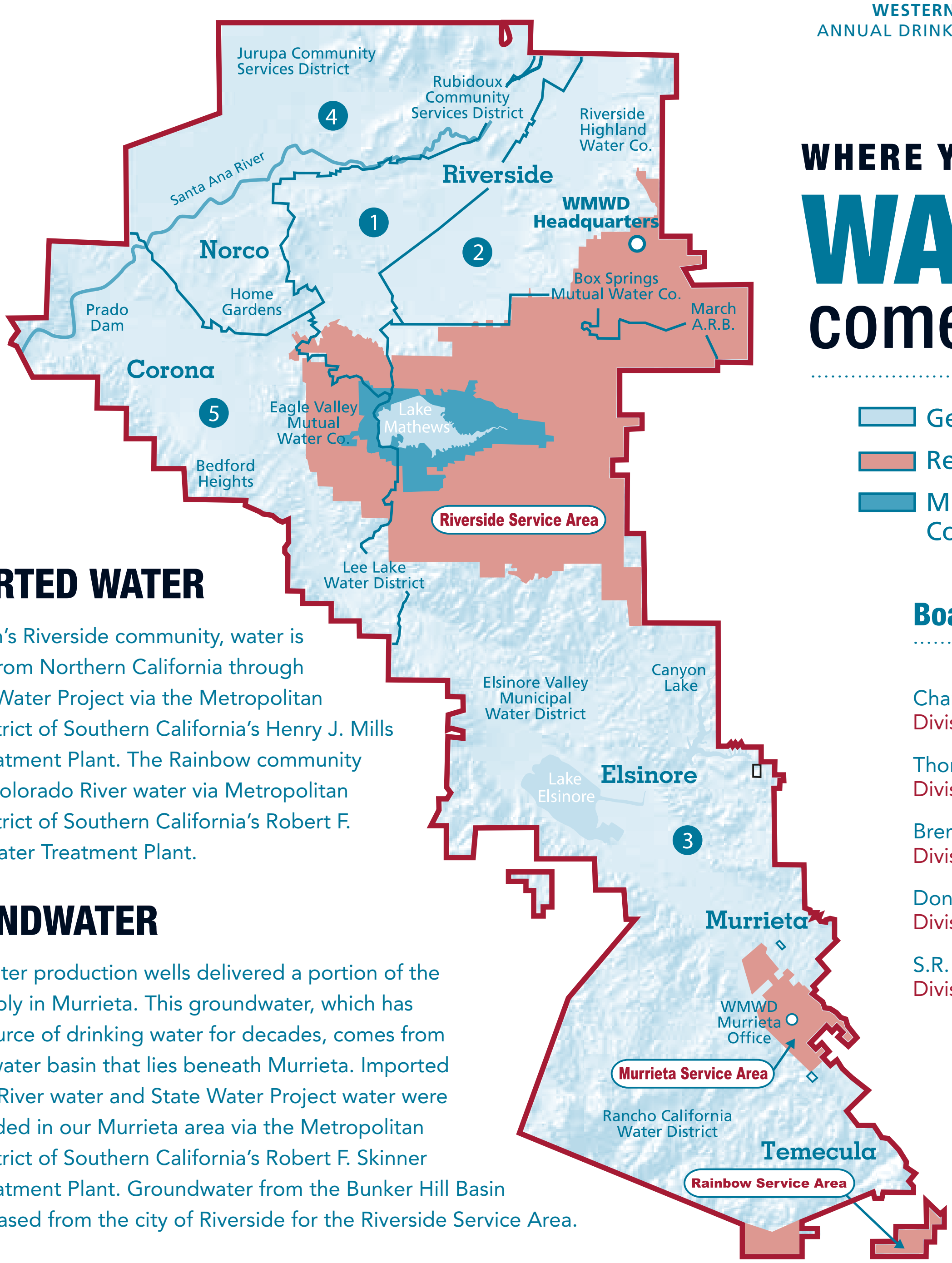
- ***Microbial contaminants***, such as viruses and bacteria that may come from sewage treatment plants, septic systems, agriculture, livestock operations and wildlife.
- ***Inorganic contaminants***, such as salts and metals, that can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- ***Pesticides and herbicides***, which may come from a variety of sources such as agriculture, urban storm water runoff and residential uses.
- ***Organic chemical contaminants***, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, agricultural application and septic systems.
- ***Radioactive contaminants***, which can be naturally-occurring or the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the U. S. EPA and the California Department of Public Health (CDPH) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates bottled water. For more information, log onto the Department web site at: www.cdph.ca.gov.

Securing Your Water Supply

Éste informe contiene información muy importante sobre su agua potable. Tradúzcalo o hable con alguien que lo entienda bien. Si desea más informacion, por favor contacte a Public Affairs en Western Municipal Water District, 951.776.4519 or en water@wmwd.com

WHERE YOUR WATER comes from



General District
Retail District
Multi-Species Habitat Conservation Plan

Board of Directors

Charles D. Field
Division 1

Thomas P. Evans
Division 2

Brenda Dennstedt
Division 3

Donald D. Galleano
Division 4

S.R. "Al" Lopez
Division 5

IMPORTED WATER

In Western's Riverside community, water is supplied from Northern California through the State Water Project via the Metropolitan Water District of Southern California's Henry J. Mills Water Treatment Plant. The Rainbow community receives Colorado River water via Metropolitan Water District of Southern California's Robert F. Skinner Water Treatment Plant.

GROUNDWATER

Groundwater production wells delivered a portion of the water supply in Murrieta. This groundwater, which has been a source of drinking water for decades, comes from a groundwater basin that lies beneath Murrieta. Imported Colorado River water and State Water Project water were also provided in our Murrieta area via the Metropolitan Water District of Southern California's Robert F. Skinner Water Treatment Plant. Groundwater from the Bunker Hill Basin was purchased from the city of Riverside for the Riverside Service Area.

Our Service Areas

Riverside Service Area

The communities of Orangecrest, Mission Grove, El Sobrante, Eagle Valley, Temescal Canyon, Woodcrest, Lake Mathews and March Air Reserve Base.

Murrieta Service Area

A 6.5 mile portion of the city of Murrieta located west of the I-15 freeway including historic downtown Murrieta.

Rainbow Service Area

A small area of unincorporated Riverside County south of the city of Temecula.

WATER QUALITY TABLE for CALENDAR YEAR 2009

REGULATED AT THE WATER SOURCE

Primary Drinking Water Standards Mandatory Health Related Standards	Units of Measure	State/Fed MCL [MRDL]	PHG (MCLG) [MRDLG]	Riverside (a)		Murrieta (a)		Rainbow (a)		Primary Sources
Inorganic Chemicals				Average	Range	Average	Range	Average	Range	
Aluminum	ppb	1000	600	96	ND – 160	ND	ND	ND	ND	Residue from water treatment process; erosion of natural deposits
Arsenic	ppb	10	0.004	2.5	ND – 3.4	ND	ND – 3.0	ND	ND	Erosion of natural deposits
Barium	ppb	1000	2000	ND	ND	112	ND – 250	ND	ND – 110	Discharge of oil drilling waste; erosion of natural deposits
Chromium (Total)	ppb	50	100	ND	ND	ND	ND	ND	ND	Discharge from steel/pulp mills; erosion of natural deposits
Fluoride	ppm	2	1	0.7	0.5 – 0.9	0.6	0.3 – 1.1	0.9	0.6 – 0.9	Erosion of natural deposits
Nitrate (NO_3^-) (b)	ppm	45	45	1.1	ND – 6.8	ND	ND – 0.4	ND	ND – 0.4	Industrial waste discharge, agricultural practice, leaking septic tank
Perchlorate	ppb	6	6	ND	ND	ND	ND	ND	ND	Industrial waste discharge
Radiological										
Gross Alpha	pCi/L	15	(0)	ND	ND – 5.5	3.6	3.3 – 4.3	3.6	3.3 – 4.3	Erosion of natural deposits
Gross Beta	pCi/L	50	(0)	ND	ND – 7.5	ND	ND – 8.8	ND	ND – 8.8	Erosion of natural deposits
Uranium	pCi/L	20	0.43	3.0	1.5 – 21	2.5	2.3 – 2.7	2.5	2.3 – 2.7	Erosion of natural deposits
Secondary Standards - Aesthetic Standards Inorganic Chemicals										
Chloride	ppm	500	N/A	80	31 – 99	101	93 – 120	97	93 – 100	Runoff/leaching from natural deposits
Hardness	ppm	NS	N/A	130	87 – 232	242	160 – 300	270	190 – 300	Erosion of natural deposits
Manganese	ppb	50	NL = 500	ND	ND	ND	ND – 25	ND	ND	Leaching from natural deposits
MBAS (Foaming Agents)	ppb	0.5	N/A	ND	ND	ND	ND – 0.07	ND	ND	Municipal and industrial waste discharge
Sodium	ppm	NS	N/A	70	40 – 83	92	78 – 100	93	78 – 100	Erosion of natural deposits
Sulfate	ppm	500	N/A	68	32 – 78	168	49 – 250	220	130 – 250	Runoff/leaching from natural deposits
Total Dissolved Solids (TDS)	ppm	1000	N/A	335	250 – 458	544	410 – 640	580	440 – 640	Runoff/leaching from natural deposits
Physical Properties										
Color	Units	15	N/A	ND	ND – 3	ND	ND – 5	ND	ND	Naturally-occurring organic material
Specific Conductance	µS/cm	1600	N/A	593	460 – 670	916	760 – 1100	960	760 – 1100	Substance that forms ions when in water
Turbidity (c)	NTU	TT/5	N/A	ND	ND - 0.46	ND	ND – 0.23	ND	ND	Soil runoff
Other Parameters Tested										
Alkalinity	ppm	NS	N/A	91	69 – 180	132	94 – 190	110	94 – 120	Dissolved as water passes through limestone deposits
Calcium	ppm	NS	N/A	30	17 – 73	62	44 – 74	65	44 – 74	Dissolved as water passes through limestone deposits
Chlorate	ppb	N/A	NL = 800	54	ND – 79	34	ND – 79	34	ND – 79	By-product of drinking water chlorination; industrial processes
Magnesium	ppm	NS	N/A	12	9 -15	21	9 – 29	26	20 – 29	Naturally-occurring
N-Nitrosodimethylamine (NDMA)	ppt	NS	NL = 10	4	ND – 10	ND	ND – 4	ND	ND – 4	Industrial processes, by-product of naturally-occurring drinking water chloramination
Potassium	ppm	NS	N/A	2.9	2.4 – 4	3.7	1.4 – 5	4.7	4.2 – 5	Naturally-occurring
Unregulated Chemicals Requiring Monitoring										
Boron	ppb	NS	NL = 1000	148	100 – 180	140	130 – 140	140	130 – 140	Runoff/leaching from natural deposits; industrial wastes
Chromium VI	ppb	NS	N/A	0.5	0.05 – 2.3	0.16	0.08 – 0.23	0.16	0.08 – 0.23	Industrial waste discharge
Vanadium	ppb	NS	NL = 50	6.4	5.7 – 7	ND	ND	ND	ND	Erosion of natural deposits

REGULATED IN THE DISTRIBUTION SYSTEM

Disinfection By-products				Riverside (a)		Murrieta (a)		Rainbow (a)		
Total Trihalomethanes (TTHMs)	ppb	80 (d)	N/A	24	7.1 – 36	44	25 – 63	42	28 – 51	By-product of drinking water disinfection
Haloacetic Acids (HAA5)	ppb	60 (d)	N/A	15	ND – 19	22	ND – 31	19	15 – 19	By-product of drinking water disinfection
Bromate	ppb	10 (d)	0.1	8	3.9 – 12	N/A	N/A	N/A	N/A	By-product of drinking water ozonation
Microbiological										
Total Coliform	%	5.0	(0)	0	No Range	0.5	No Range	0	No Range	Naturally present in the environment
Disinfectant										
Chloramines	ppm	[4]	[4]	1.7	0.4 – 2.5	1.8	0.4 – 3.8	2.1	1.8 – 2.7	Drinking water disinfectant added for treatment
Organic Chemicals										
Dibromochloropropane	ppt	200	1.7	ND	ND – 20	ND	ND	ND	ND	Banned hematocide that may still be present in soils

Abbreviations

MCL	Maximum Contaminant Level	**PHG**	Public Health Goal
MRDL	Maximum Residual Disinfectant Level	**ppm**	parts per million
MRDLG	Maximum Residual Disinfectant Level Goal	**ppb**	parts per billion
N/A	Not Available	**ppt**	parts per trillion
ND	Not Detected	**pCi/L**	picoCuries per Liter
NL	Notification Level	**TON**	Threshold Odor Number
NS	No MCL Standard	**TT**	Treatment Technique
NT	Testing Not Performed	**Units**	A measure of the relative color or odor in the water
NTU	Nephelometric Turbidity Units; a measure of the suspended material in water	**µS/cm**	microSiemens per centimeter
		<	Less than
		[ ]	Brackets refer to MRDL or MRDLG

Footnotes

(a) Groundwater from the Bunker Hill Basin was purchased from the City of Riverside to supplement the imported water source from the Metropolitan Water District Mills Treatment Plant. The presented data for Murrieta reflects the characteristics of groundwater distributed to the service area. Water was also imported from Metropolitan Water District's Skinner Treatment Plant to supplement groundwater. The information for the Rainbow system, except as noted, reflects the quality of water obtained from Eastern Municipal Water District.

(b) Nitrate levels in California are measured as NO_3^-, and the MCL is 45 ppm. The EPA regulates nitrates as N^-, and the MCL is 10 ppm. Both measurements represent the same nitrate concentration.

(c) Turbidity is a measure of the cloudiness of the water. High turbidity can hinder the effectiveness of disinfectants. We monitor it because it is a good indicator of water quality and the effectiveness of filtration systems, where used.

(d) Compliance to the MCL is based on running annual average only, not range parameters.

Hotline

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants doesn't necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the U.S. Environmental Protection Agency Safe Drinking Water Hotline at **800.426.4791**.

WATER USE IT WISELY®

Special Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants, can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. U.S. Environmental Protection Agency/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *cryptosporidium* and other microbial contaminants are available from the U.S. Environmental Protection Agency Safe Drinking Water Hotline at 800.426.4791. *Cryptosporidium* is a microbial pathogen found in surface water throughout the U.S.

Although filtration removes *cryptosporidium*, the most commonly used filtration methods cannot guarantee 100 percent removal. Ingestion of *cryptosporidium* may cause cryptosporidiosis, an abdominal infection. Symptoms of infection include nausea, diarrhea and abdominal cramps. Most healthy individuals can overcome the disease within a few weeks. However, immuno-compromised people are at greater risk of developing life-threatening illness. We encourage immuno-compromised individuals to consult their doctor regarding appropriate precautions to take to avoid infection. *Cryptosporidium* must be ingested to cause disease, and it may spread through means other than drinking water. Our water quality monitoring indicates no *cryptosporidium* organisms in the Mills, as well as Skinner, source and finished water.

Nitrate in drinking water at levels above 45 mg/L is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of skin. Nitrate levels above 45 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant or you are pregnant, you should ask advice from your health care provider. Water in all Western service areas is well below the 45 mg/L level.

Westerns's Water Testing

Drinking water in Western's service area comes from Northern California via the State Water Project, the Colorado River and local groundwater.

The imported water reaches Riverside County and is treated at either Metropolitan Water District's Mills Treatment Plant or its Skinner Treatment Plant. The water is filtered to remove any particulates and then disinfected to remove any harmful microorganisms by ozone – a highly energetic form of oxygen. Treated – or finished – water, including the groundwater, is then dosed with a combination of chlorine and ammonia, which forms chloramines, to maintain a residual disinfectant level keeping the water pathogen free.

After it's treated, the water enters a distribution system stretching over 70-square miles. Western Operations staff conducts daily, weekly and annual sampling of the water.

Water samples are tested in the field to determine pH (a measure of acidity/alkalinity) and residual disinfectant. Samples are also delivered to a California State Certified Laboratory, E.S. Babcock & Sons Laboratories, Inc., for further microbiological testing, as well as organic and inorganic chemical testing.

The lab uses analytical devices as simple as pH meters or as complex as gas chromatographs and mass spectrometers. The results are delivered to the California Department of Public Health on a monthly, quarterly and annual basis ensuring that only the highest quality drinking water is provided to our customer.

Special Exceptions

Kidney Dialysis/Aquariums

Customers who have unique water quality needs and who use specialized home treatments, such as kidney dialysis machines, should make the necessary adjustments to remove chloramines. Like chlorine, chloramines are toxic to dialysis water. Customers who have fish tanks in their homes or businesses should also take precautions to remove chloramines prior to adding water to tanks. Effective treatments include using granular-activated carbon filters or using chemicals specifically designed to remove chloramines.

Industry Leading Water Monitoring and Treatment Process

A key step in the treatment process is disinfection. Without disinfection, water would not be safe to drink.

Western water quality staff works with the Metropolitan Water District of Southern California, the State Department of Public Health and independent certified testing laboratories to continuously monitor the quality of the water supplies. Metropolitan, the supplier of much of the water Western provides to its customers, has one of the most sophisticated water quality monitoring and treatment programs in the world. It performs continuous water monitoring and conducts several hundred water quality tests per day. Western then performs even more testing with more than 85 routine bacteriological samplings and more than 25 physical samplings taken from more than 40 different locations. These samples are compared to more than 175 state and federal standards.

Water delivered within the Riverside Service Area, which comes from the Metropolitan Water District's Mills Water Treatment Plant, has been through a complex treatment process. Metropolitan Water District uses ozone as the primary disinfectant in its Mills Treatment Plant. The water is also disinfected with chloramines. Chloramines, a combination of chlorine and ammonia, are a type of disinfectant used to prevent re-growth of potentially harmful bacteria in the water distribution system. They're approved by the Environmental Protection Agency as a disinfectant for drinking water and have been used safely for years. Chloraminated water is safe to drink because the digestive process neutralizes the chloramines before they enter the bloodstream. Chloraminated water is also safe for all other daily uses, including bathing and cooking. In addition, using chloramines as the residual disinfectant results in lower overall levels of disinfection by-products such as trihalomethanes.

Additional Riverside Service Area supply comes from groundwater similar to our Murrieta Service Area. Within the Murrieta Service Area, the water delivered to the customer's tap is chloraminated at each well site before entering the distribution system. The imported water supplied from the Metropolitan Water District's Skinner Water Treatment Plant is also chloraminated and is delivered to the Rainbow Service Area.

Source Water Assessment

A Source Water Assessment lists possible contaminants that might affect the quality of your water sources.

The assessment of the Murrieta system was completed in July 2001 and identified no known immediate threats to the groundwater. In Dec. 2002, the Metropolitan Water District completed its source water assessment of its State Water Project supply and the Colorado River source. The Colorado River source is considered to be most vulnerable to urban/storm water runoff, increasing urbanization in the watershed and wastewater. State Water Project supplies are considered to be most vulnerable to urban/storm water runoff, wildlife, agriculture, recreation and wastewater. Copies of complete assessments are available from Western Municipal Water District. Please contact the Public Affairs Office at 951.776.4519 or via email at water@wmwd.com for further assistance.

Lead and Copper Testing

Lead and Copper Testing (Inorganic) – regulated at customer's tap	Lead (ppb)	Copper (ppm)
Action Level @ 90th Percentile	15	1.3
MCLG	N/A *	1.3
Riverside		
90th percentile value	ND*	0.110
# over action level	0 of 46	0 of 46
Murrieta		
90th percentile value	ND*	0.320
# over action level	0 of 21	0 of 21
Rainbow		
90th percentile value	12	0.306
# over action level	1 of 8	0 of 8

The Lead and Copper Rule (LCR) was developed to protect public health by minimizing lead and copper levels in drinking water. The most common source of lead and copper in drinking water is corrosion of plumbing materials. Plumbing materials that can be made with lead and copper include pipes, solder, fixtures and faucets. The LCR established an action level of 15 ppb (parts per billion) for lead and 1.3 ppm (parts per million) for copper based on the 90th percentile level of tap water samples. This means no more than 10 percent of your samples can be above either action level. The Maximum Contaminant Level Goal (MCLG) for copper is 1.3 ppm; there is no MCLG for lead. The number of homes tested for the LCR in Riverside was 46; Murrieta, 21; and Rainbow, 8. Lead and copper are sampled on a state mandated three year testing cycle with sampling conducted at the customer's tap.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Western Municipal Water District is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Forty-six homes tested in the Riverside service area; 21 tested in the Murrieta service area with the last three year testing cycle completed in August 2007. Lead and copper are sampled on a state mandated three year testing cycle. Sampling is required within the distribution system. Eight homes were tested in the Rainbow service area with the last three year testing cycle completed in June 2009.

** Please see abbreviations on page 4.*

Measurement Terms

This water quality table provides data on the levels of constituents detected and how these compare to state standards. If you have questions, suggestions or comments about the information contained in this 2010 Water Quality Report, or for additional copies, please contact Matt Buck at 951.789.5085 or via email at mbuck@wmwd.com.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste and appearance of drinking water.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Notification Level (NL): The level at which notification of the public water system's governing body is required. Prior to 2005, NL was known as the Action Level (AL).

Primary Drinking Water Standards (PDWS): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected health risk. PHGs are set by the California Environmental Protection Agency.

Regulatory Action Level (AL): The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements that a water system must follow.

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

WATER QUALITY EXCELLENCE

METROPOLITAN'S WATER QUALITY IS EQUAL OR BETTER THAN REQUIRED
FOR ALL STANDARDS INTENDED TO SAFEGUARD PUBLIC HEALTH

Annual Drinking Water Quality Report 2010

Covering the reporting period of
January — December 2009

2009 Water Quality Table

	B	C	D	F	G	H					I
						Treatment Plant Effluent					
	Parameter	Units	State MCL [MRDL]	PHG (MCLG) [MRDLG]	Range Average	Weymouth Plant	Diemer Plant	Jensen Plant	Skinner Plant	Mills Plant	Major Sources in Drinking Water
A	Percent State Project Water	%	NA	NA	Range Average	0 - 34 12	3 - 34 14	100 100	6 - 52 20	100 100	NA
E	**PRIMARY STANDARDS - Mandatory Health-Related Standards**										
	CLARITY										
	Combined Filter Effluent Turbidity	NTU %	0.3 95 (a)	NA	Highest **% < 0.3**	0.06 100	0.06 100	0.06 100	0.08 100	0.18 100	Soil runoff
	MICROBIOLOGICAL										
	Total Coliform Bacteria (b)	%	5.0	(0)	Range **Average**	**Distribution System-wide:** 0 - 0.2 **Distribution System-wide:** 0					Naturally present in the environment
	Heterotrophic Plate Count (HPC) (c)	CFU/ mL	TT	NA	Range **Average**	**Distribution System-wide:** TT **Distribution System-wide:** TT					Naturally present in the environment
	ORGANIC CHEMICALS										
	Acrylamide	NA	TT	(0)	Range **Average**	TT TT	TT TT	TT TT	TT TT	TT TT	Water treatment chemical impurities
	Epichlorohydrin	NA	TT	(0)	Range **Average**	TT TT	TT TT	TT TT	TT TT	TT TT	Water treatment chemical impurities
	INORGANIC CHEMICALS										
	Aluminum (d)	ppb	1,000	600	Range **Highest RAA**	110 - 240 160	100 - 230 170	ND - 100 76	ND ND	ND - 160 96	Residue from water treatment process; natural deposits erosion
	Arsenic	ppb	10	0.004	Range **Highest RAA**	ND - 2.5 2.2	ND - 2.6 2.3	2.5 - 3.9 3.1	ND ND	ND - 3.4 2.6	Natural deposits erosion; glass and electronics production wastes
	Barium	ppb	1,000	2,000	Range **Average**	110 - 140 120	120 - 140 130	ND ND	ND - 110 ND	ND ND	Oil and metal refineries discharge; natural deposits erosion
					Control Range **Optimal Fluoride Level**	0.7 - 1.3 0.8	0.7 - 1.3 0.8	0.7 - 1.3 0.8	0.7 - 1.3 0.8	0.6 - 1.2 0.7	
	Fluoride (e) (treatment-related)	ppm	2.0	1	Range **Average** Range	0.7 - 1.0 0.8 **Distribution System-wide:** 0.6 - 1.0	0.7 - 0.9 0.8	0.6 - 0.9 0.8	0.7 - 1.0 0.8	0.5 - 0.9 0.7	Water additive for dental health
	Nitrate (as N) (f)	ppm	10	10	Range **Highest RAA**	ND - 0.4 0.4	ND - 0.4 0.4	0.6 - 0.9 0.8	ND - 0.4 ND	ND - 0.8 0.6	Runoff and leaching from fertilizer use; sewage; natural deposits erosion
	RADIONUCLIDES (g)										
	Gross Alpha Particle Activity	pCi/L	15	(0)	Range **Average**	ND - 7.6 5.2	3.8 - 9.3 5.6	ND - 7.3 3.4	3.3 - 4.3 3.6	ND - 5.5 ND	Erosion of natural deposits
	Gross Beta Particle Activity (h)	pCi/L	50	(0)	Range **Average**	ND - 9.7 4.2	ND - 6.4 4.3	ND - 5.2 ND	ND - 8.8 ND	ND - 7.5 ND	Decay of natural and man-made deposits
	Uranium	pCi/L	20	0.43	Range **Average**	2.4 - 3.4 2.9	2.9 - 3.7 3.3	1.6 - 2.0 1.8	2.3 - 2.7 2.5	1.5 - 2.8 2.1	Erosion of natural deposits
	DISINFECTION BY-PRODUCTS, DISINFECTANT RESIDUALS, AND DISINFECTION BY-PRODUCTS PRECURSORS (i)										
	Total Trihalomethanes (TTHM) (j)	ppb	80	NA	Range **Average**	25 - 67 43	26 - 56 43	17 - 33 28	26 - 56 41	20 - 33 25	By-product of drinking water chlorination
	Total Trihalomethanes (TTHM) (j)	ppb	80	NA	Range **Highest RAA**	**Distribution System-wide:** 15 - 81 **Distribution System-wide:** 39					By-product of drinking water chlorination
	Haloacetic Acids (five) (HAA5) (k)	ppb	60	NA	Range **Average**	5.6 - 20 11	7.3 - 12 10	2.0 - 3.2 2.5	9.9 - 15 12	2.3 - 7.0 4.3	By-product of drinking water chlorination
	Haloacetic Acids (five) (HAA5) (k)	ppb	60	NA	Range **Highest RAA**	**Distribution System-wide:** 1.5 - 30 **Distribution System-wide:** 14					By-product of drinking water chlorination
	Total Chlorine Residual	ppm	[4.0]	[4.0]	Range **Highest RAA**	**Distribution System-wide:** 1.5 - 3.0 **Distribution System-wide:** 2.4					Drinking water disinfectant added for treatment
	Bromate (l)	ppb	10	0.1	Range **Highest RAA**	NA NA	NA NA	4.2 - 12 6.9	NA NA	3.9 - 12 8.0	By-product of drinking water ozonation
	DBP Precursor Control (TOC)	ppm	TT	NA	Range **Average**	TT TT	TT TT	TT TT	TT TT	TT TT	Various natural and man-made sources
E	**SECONDARY STANDARDS - Aesthetic Standards**										
	Aluminum (d)	ppb	200	600	Range **Highest RAA**	110 - 240 160	100 - 230 170	ND - 100 76	ND ND	ND - 160 96	Residue from water treatment process; natural deposits erosion
	Chloride	ppm	500	NA	Range **Highest RAA**	89 - 100 98	89 - 99 97	77 - 82 79	93 - 100 97	67 - 99 85	Runoff/leaching from natural deposits; seawater influence
	Color	Units	15	NA	Range **Highest RAA**	1 - 2 2	1 - 2 2	1 - 2 2	1 - 2 2	1 - 2 2	Naturally occurring organic materials
	Odor Threshold (m)	TON	3	NA	Range **Average**	2 2	2 2	2 2	**12 - 24** **18**	2 2	Naturally occurring organic materials
	Specific Conductance	µS/cm	1,600	NA	Range **Highest RAA**	850 - 1,100 1,000	880 - 1,100 1,000	570 - 610 590	760 - 1,100 960	460 - 670 590	Substances that form ions in water; seawater influence
	Sulfate	ppm	500	NA	Range **Highest RAA**	180 - 260 240	190 - 250 240	56 - 70 66	130 - 250 220	32 - 77 68	Runoff/leaching from natural deposits; industrial wastes
	Total Dissolved Solids (TDS)	ppm	1,000	NA	Range **Highest RAA**	510 - 660 620	530 - 640 610	310 - 340 330	440 - 640 580	250 - 380 330	Runoff/leaching from natural deposits; seawater influence
	Turbidity (a)	NTU	5	NA	Range **Highest RAA**	0.05 - 0.06 0.06	0.04 - 0.05 0.04	0.04 - 0.05 0.04	0.04 - 0.05 0.05	0.05 - 0.08 0.06	Soil runoff

ABBREVIATIONS AND DEFINITIONS

CFU/mL	Colony-Forming Units per milliliter	pCi/L	picoCuries per liter
DBP	Disinfection By-Products	PHG	Public Health Goal - The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.
MCL	Maximum Contaminant Level - The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.	ppb ppm	parts per billion or micrograms per liter (µg/L) parts per million or milligrams per liter (mg/L)
MCLG	Maximum Contaminant Level Goal - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency (USEPA).	RAA	Running Annual Average
MRDL	Maximum Residual Disinfectant Level - The highest level of a disinfectant allowed in drinking water. Addition of a disinfectant is necessary for control of microbial contaminants.	TOC	Total Organic Carbon
MRDLG	Maximum Residual Disinfectant Level Goal - The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.	TON	Threshold Odor Number
N	Nitrogen	TT	Treatment Technique - A required process intended to reduce the level of a contaminant in drinking water.
NA	Not Applicable	µS/cm	microSiemen per centimeter; or micromho per centimeter (µmho/cm)
ND	Not Detected		Primary Standards (Primary Drinking Water Standards) - MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.
NTU	Nephelometric Turbidity Units		Secondary Standards - Requirements that ensure the appearance, taste and smell of drinking water are acceptable.

FOOTNOTES

(a) The turbidity level of the filtered water shall be less than or equal to 0.3 NTU in 95% of the measurements taken each month and shall not exceed 1 NTU at any time. Turbidity is a measure of the cloudiness of the water and is an indicator of treatment performance. The averages and ranges of turbidity shown in the Secondary Standards were based on the treatment plant effluent.

(b) Total coliform MCLs: No more than 5.0% of the monthly samples may be total coliform-positive. Compliance is based on the combined distribution system sampling from all the treatment plants. In 2009, 8116 samples were analyzed and 36 samples were positive for total coliforms. The MCL was not violated.

(c) All distribution system samples collected had detectable total chlorine residuals and no HPC was required. HPC reporting level is 1 CFU/mL.

(d) Aluminum has both primary and secondary standards.

(e) Metropolitan was in compliance with all provisions of the State's Fluoridation System Requirements.

(f) State MCL is 45 mg/L as nitrate, which is the equivalent of 10 mg/L as N.

(g) Data collected from four consecutive quarters of monitoring in 2008.

(h) The gross beta particle activity MCL is 4 millirem/year annual dose equivalent to the total body or any internal organ. The screening level is 50 pCi/L.

(i) Metropolitan was in compliance with all provisions of the Stage 1 Disinfectants/ Disinfection By-Products (D/DBP) Rule. Compliance was based on the RAA.

(j) Reporting level is 0.5 ppb for each of the following: bromodichloromethane, bromoform, chloroform, and dibromochloromethane.

(k) The detection limit for purposes of reporting is 1.0 ppb for each of the following: dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid; and 2.0 ppb for monochloroacetic acid.

(l) Bromate reporting level is 3 ppb.

(m) Data based on the State-required quarterly monitoring following MCL exceedance. Metropolitan utilizes a flavor-profile analysis (FPA) method that can detect odor occurrences more accurately and found the FPA samples from this location acceptable. No taste and odor event was observed and no complaints were received during the period.

Other **Detected Constituents** That May be of Interest to Consumers

Parameter	Units	NL	Range / Average	Treatment Plant Effluent: Weymouth Plant	Diemer Plant	Jensen Plant	Skinner Plant	Mills Plant
Alkalinity	ppm	NA	Range	100 - 130	98 - 120	84 - 93	94 - 120	69 - 95
			Highest RAA	120	120	90	110	83
Boron	ppb	1,000	Range	120 - 140	120 - 140	190 - 220	130 - 140	110 - 180
			Average	130	130	200	140	150
Calcium	ppm	NA	Range	54 - 76	56 - 75	27 - 33	44 - 74	17 - 30
			Highest RAA	68	68	31	65	26
Chlorate	ppb	800	Range	74	66	ND	34	54
			Range	**Distribution System-wide:** ND - 79				
Chromium VI (a)	ppb	NA	Range	0.04 - 0.13	0.04 - 0.11	0.36 - 0.63	0.08 - 0.23	0.05 - 0.46
			Highest RAA	0.13	0.12	0.50	0.16	0.35
Corrosivity (b) (as Aggressiveness Index)	AI	NA	Range	12.0 - 12.4	12.0 - 12.3	12.0 - 12.1	11.9 - 12.3	11.8 - 12.2
			Average	12.2	12.2	12.0	12.2	12.0
Corrosivity (c) (as Saturation Index)	SI	NA	Range	0.25 - 0.41	0.22 - 0.40	0.13 - 0.27	0.08 - 0.39	0.09 - 0.30
			Average	0.33	0.33	0.21	0.31	0.22
Hardness	ppm	NA	Range	230 - 310	240 - 300	120 - 130	190 - 300	87 -130
			Highest RAA	280	280	130	270	120
Heterotrophic Plate Count (HPC) (d)	CFU/mL	NA	Range	ND - 2	ND - 1	ND - 20	ND - 3	ND - 140
			Average	ND	ND	ND	ND	1
Magnesium	ppm	NA	Range	23 - 30	23 - 29	11 - 12	20 - 29	9.0 - 15
			Highest RAA	27	27	13	26	12
N-Nitrosodimethylamine (NDMA) (e,f)	ppb	0.01	Range	ND - 0.005	ND	0.002 - 0.006	ND - 0.002	ND - 0.01
			Range	**Distribution System-wide:** ND - 0.01				
pH	pH Units	NA	Range	7.8 - 8.0	7.8 - 8.0	8.1 - 8.3	7.9 - 8.0	8.3 - 8.5
			Average	7.9	7.9	8.2	7.9	8.4
Potassium	ppm	NA	Range	4.2 - 5.3	4.3 - 5.1	2.6 - 2.9	4.2 - 5.0	2.4 - 3.5
			Highest RAA	4.8	4.8	2.8	4.7	2.9
Sodium	ppm	NA	Range	84 - 100	86 - 100	66 - 74	78 - 100	54 - 82
			Highest RAA	99	98	68	93	73
Total Organic Carbon (TOC)	ppm	NA	Range	1.9 - 2.4	2.0 - 2.6	1.2 - 1.7	1.8 - 2.3	1.4 - 3.2
			Highest RAA	2.3	2.3	1.7	2.2	2.1
Vanadium	ppb	50	Range	ND - 3.8	ND - 3.4	6.1 - 6.7	ND	5.7 - 6.8
			Average	3.2	3.1	6.4	ND	6.3

Abbreviation and Definitions (please refer to the main table for other abbreviations and definitions)

Abbreviation

NL Notification Level - The level at which notification of the public water system's governing body is required. Prior to 2005, NL was known as action level (AL).

Footnotes

(a) Chromium VI reporting level is 0.03 ppb.

(b) AI <10.0 = Highly aggressive and very corrosive water
AI ≥ 12.0 = Non-aggressive water
AI (10.0 - 11.9) = Moderately aggressive water

(c) Positive SI index = non-corrosive; tendency to precipitate and/or deposit scale on pipes.
Negative SI index = corrosive; tendency to dissolve calcium carbonate

(d) All distribution system samples collected had detectable total chlorine residuals and no HPC was required. HPC reporting level is 1 CFU/mL.

(e) Analysis was conducted by Metropolitan Water Quality Laboratory using Standard Methods 6450B.

(f) The Federal Unregulated Contaminants Monitoring Rule Second Cycle (UCMR2) was conducted between November 2008 and August 2009 for the assessment monitoring of 10 chemical contaminants under List 1 and the screening survey of 15 contaminants under List 2. All List 1 and List 2 contaminants from the treatment plant effluent were not detected except for NDMA (List 2). Information on these samples is available upon request. Additionally, unregulated contaminants are those that do not yet have a federal drinking water standard. The purpose of the monitoring is to help USEPA decide whether the contaminants should have a standard.

APPENDIX D – MONITORING PROTOCOLS

Riverside and Arlington Basins Groundwater Monitoring Protocols

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ACRONYMS AND ABBREVIATIONS

1969 Western Judgment	Judgment in *Western Municipal Water District of Riverside County et al., vs. East San Bernardino County Water District* et al.
Basin Plan	Water Quality Control Plan for the Santa Ana Basin
DPH	California Department of Public Health
GWMP	Groundwater Management Plan
TDS	total dissolved solids
Watermaster	Western-San Bernardino Watermaster

SECTION 1 INTRODUCTION

These Monitoring Protocols are developed as part of the Riverside Basin Groundwater Management Plan (Riverside GWMP) and the Arlington Basin Groundwater Management Plan (Arlington GWMP). The Monitoring Protocols cover both basins. With the exception of regulatory or court ordered monitoring, monitoring is performed by individual agencies on a voluntary basis, with additional monitoring activities by Western's Cooperative Well Measurement Program.

It is important that monitoring protocols and frequencies be adhered to over the long-term. As such, the protocols and frequencies are defined to be realistic for agencies that have limited funds and personnel for monitoring activities. Should an agency feel that the monitoring is an undue burden, they should request revision to the requirements in the Plan so that the most critical monitoring can be identified for continuation, while less critical monitoring can be ceased or curtailed.

These Monitoring Protocols are intended to meet the current and future needs for:

- Compliance with the Groundwater Management Plan (GWMP) Basin Management Objectives, including:
  - Groundwater levels
  - Groundwater quality
  - Land subsidence
- Trend analysis of groundwater level and groundwater quality
- Analysis of flow direction
- Future estimates of change in storage and other groundwater budget components
- Groundwater projects that will required baseline water level and water quality data for planning and operational monitoring
- Groundwater modeling efforts, which rely heavily on historical data
- Compliance with groundwater requirements of the 1969 Western Judgment (*Western Municipal Water District of Riverside County v. East San Bernardino County Water District*, Superior Court No. 78426)
- Compliance with anticipated requirements of the California Statewide Groundwater Elevation Monitoring (CASGEM) Program, authorized by SBx7 6, enacted in November 2009.

CASGEM is a particularly urgent part of these monitoring protocols as deadlines occured as soon as January 1, 2011. CASGEM is a statewide program to measure groundwater elevations in California's basins and subbasins. It establishes collaboration between local monitoring entities and DWR where the local entities collect water level data and submits the data to DWR's database. If no local entity volunteers to provide such assistance and become a Monitoring Entity, DWR assumes the monitoring role in the basin and certain entities in the basin may be ineligible for water grants or loans. Therefore, it is critical that entities within the Riverside and Arlington Basins determine who should be the Monitoring Entity or Entities for the basins and notify DWR of this intent prior to the January 1, 2011 deadline. Potential Monitoring Entities include a combination of the Western-San Bernardino Watermaster (Watermaster), Western, Valley District, and the individual retail water purveyors. Additional details are online at http://www.water.ca.gov/groundwater/casgem.

The location and frequency of sampling requires foresight into the data needs of the future. Today's monitoring is typically of little use until or unless there is a long period of record to analyze trends and a large dataset to analyze spatial variability. Decisions to monitor for water levels and water quality today can greatly improve the ease and accuracy of future water planning efforts.

LOCATIONS

WATER LEVELS

Wells currently being monitored for water levels are owned by water agencies or are private wells monitored by the Cooperative Well Measurement Program. Monitoring wells related to groundwater remediation projects and monitored by the Potentially Responsible Parties are also significant sources of data.

Wells monitored for compliance with the 1969 Western Judgment are:

- 1S 4W 21 Q3 (Johnson 1)
- 1S 4W 29 H1 (Flume 2)
- 1S 4W 29 Q1 (Flume 5)

Note that Johnson 1 is located outside of the Riverside and Arlington Basins, in the Rialto-Colton Basin. These three wells are monitored in the fall for compliance with the 822.04 feet above sea level 1963 average water level.

A list of wells recently monitored for groundwater levels is provided in Tables D-1a and D-1b and shown on Figures D-1a and D-1b, based on 2003-2007 AWQ water level data. Figures D-1a and D-1b also show wells equipped with pressure transducers. These wells should continue to be monitored and any other relevant wells should be added to the monitoring program, with a focus on dedicated monitoring wells with records of well construction and lithology.

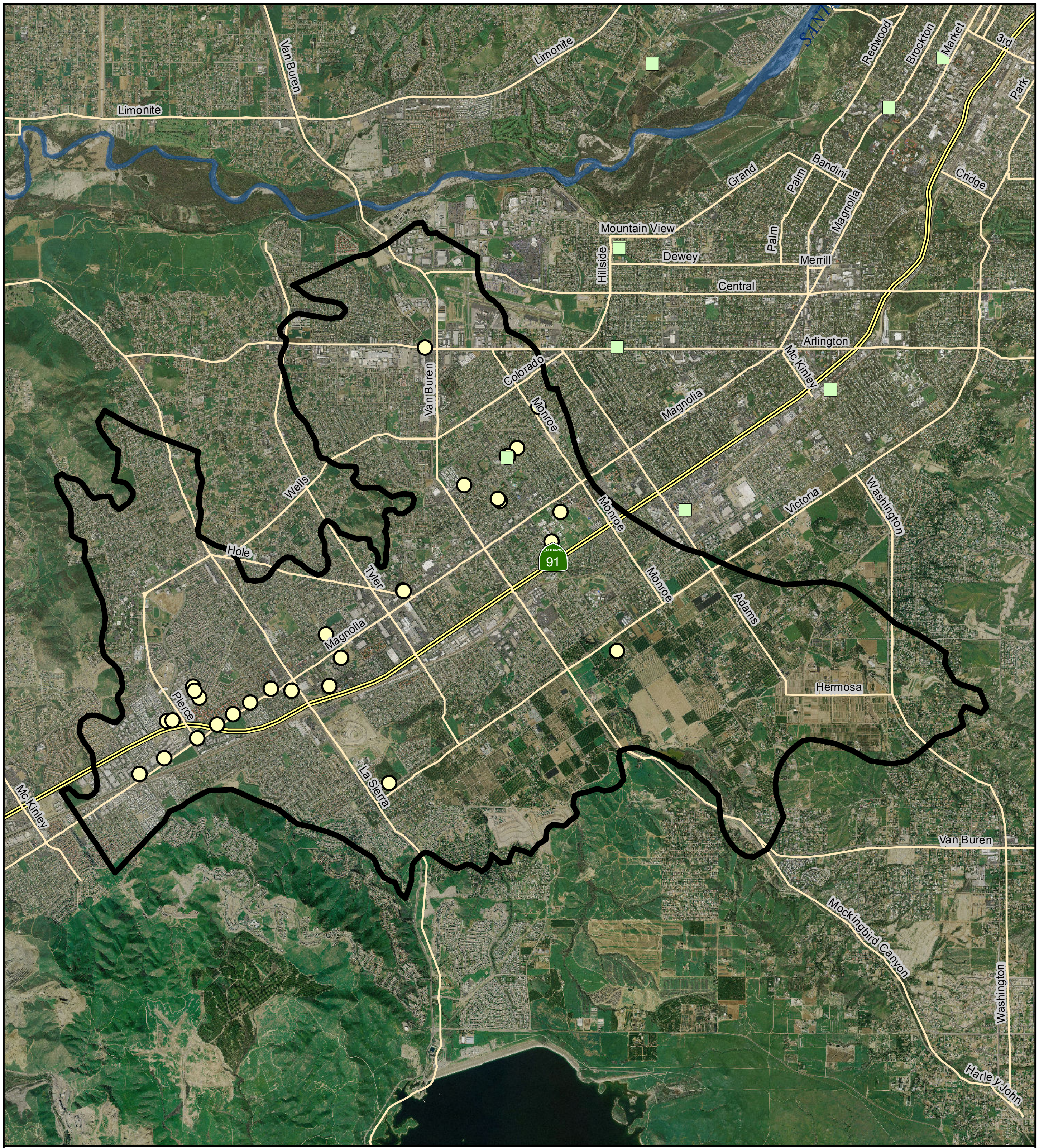
Table D-1a Wells Monitored for Water Levels, Arlington Basin

Abraham	Cal Baptist	La Sierra 6
AD-1	Daly 2	Loving Homes
AD-2	Doi	Mobil #18 D8H (#89208)
AD-3	Garfield	Pierce St Sewer 2
AD-4	Hole 1	Pierce St Sewer 3
AD-5	Hole 2	Polk*
Arlington Mutual	Iselin 1	Sherman High
Army 1	Iselin 2	Sherman Tower
Army 3	Jackson	Twin Buttes 1
Buchanan 1	La Sierra 4	Unocal (#89213)
Buchanan 2	La Sierra 5	Walton

*Polk Well has been destroyed.
Monitoring has recently begun at the Flat Rock Well.

Table D-1b Wells Monitored for Water Levels, Riverside Basin

1	Fill	Rialto CRMW-3
8	First Street	Rialto CRMW-4
#12, Airport	Flume 2	Rialto CRMW-5
#13 Hunter 6	Flume 3	Rialto CRMW-6
#14, 46th St	Flume 4	RN 16
#2, Troyer	Flume 5	RN 17
#4, Skotty	Flume 6	RN 20
#5 New 36st	Freeway Well	RN 21
#7 36&Daley	Garner	RN 22
28thSt.,#3	Garner B	RN 6
8th St	Garner C	RN 7
Arco #1941 (#94603)	Garner D	Roos
Arco #5168 (#931015)	Highgrove 1	Roos #2 S'ly
Belltown BMW-1	Highgrove 3	Russell C Well
Belltown BMW-2	Jurupa 6	SAR@RRxing
Belltown BMW-3	Jurupa 7	SIX (6)
Belltown BMW-4	Jurupa Water Co. #3	Sunnyslope #3
Brunton	La Loma	Sunnyslope #5
C-122	Laura Lane	Tequesquite CW-2A
C-124	Lincoln Heights	Tequesquite M3D
Cal Electric #3	LV 3	Tequesquite M4D
Cal Electric #4	Main Pellisier Ran	Tequesquite W-16
CL-01	Mobil #18-182 (#89330)	Tequesquite W-24
CL-05	Moore-Griffith	Tequesquite W-4A
CL-06	Mori No. 2	Twin Buttes 6
Clear Water	Mori Well	Twin Springs
Co.Parks HQ	Mulberry	Van Buren 1
CPC East Side	NO 1	Van Buren 2
Cunningham 2	No. 5 Well	West Riverside
Deberry	Olivewood 1	West Riverside RG-2
Double D Ranch	Olivewood 2	West Riverside RG-3
E	Olivewood 3	West Riverside RG-4
Edmunds "D"	Orange Acres	West Riverside RG-5
Electric Street	Palmyrita 2	West Riverside RG-6
Eleventh Strt Well	Park HQ 1	WVWD 18A
EVMWD Palm	Park HQ 2	WVWD 29
Fairmont 1	Pico #64	WVWD 41
Fairmount 2	Rialto CRMW-1	
Fast Gas (#92371) Gemco	Rialto CRMW-2	



Legend

- Groundwater Level Monitoring Wells*
- Transducer Wells
- Plan Area
- Highway
- Roads

* Groundwater Level Monitoring Wells are a subset of wells in the Cooperative Well Measuring Program that have groundwater measurment records from 2003 to 2007, locations derived from AWQ Database

N W E S

0 0.5 1 2 Miles

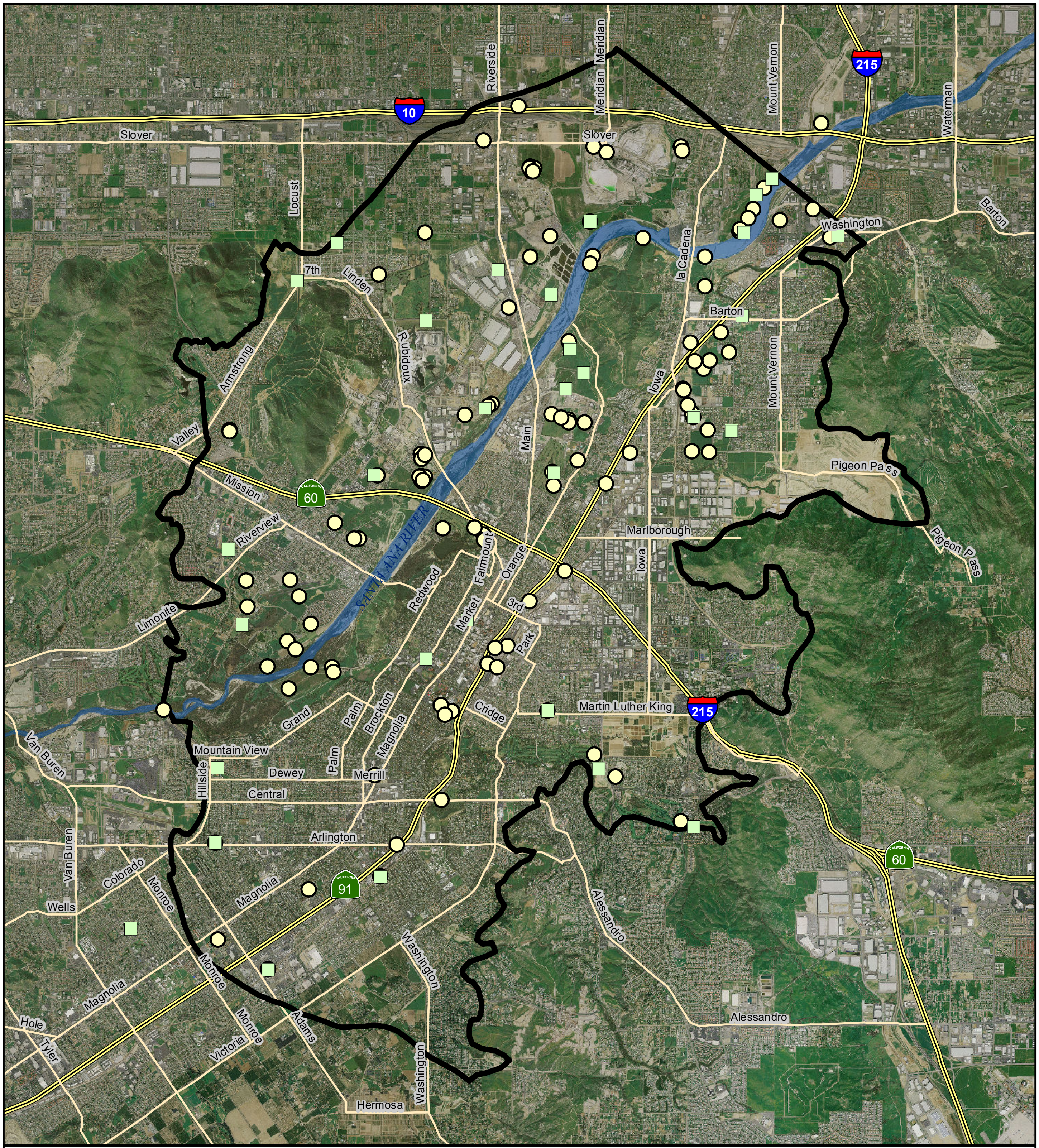
WESTERN MUNICIPAL WATER DISTRICT

Wells Monitored for Groundwater Levels

Arlington and Riverside Basin Groundwater Management Plans

2010

Figure D-1a



Legend

- Transducer Wells
- Groundwater Level Monitoring Wells*
- Plan Area
- Highways
- Roads

* Groundwater Level Monitoring Wells are a subset of wells in the Cooperative Well Measuring Program that have groundwater measurment records from 2003 to 2007, locations derived from AWQ Database

N W E S

0 0.5 1 2 Miles

CITY OF RIVERSIDE

Wells Monitored for Groundwater Levels

Arlington and Riverside Basin Groundwater Management Plans

2010

Figure D-1b

WATER QUALITY

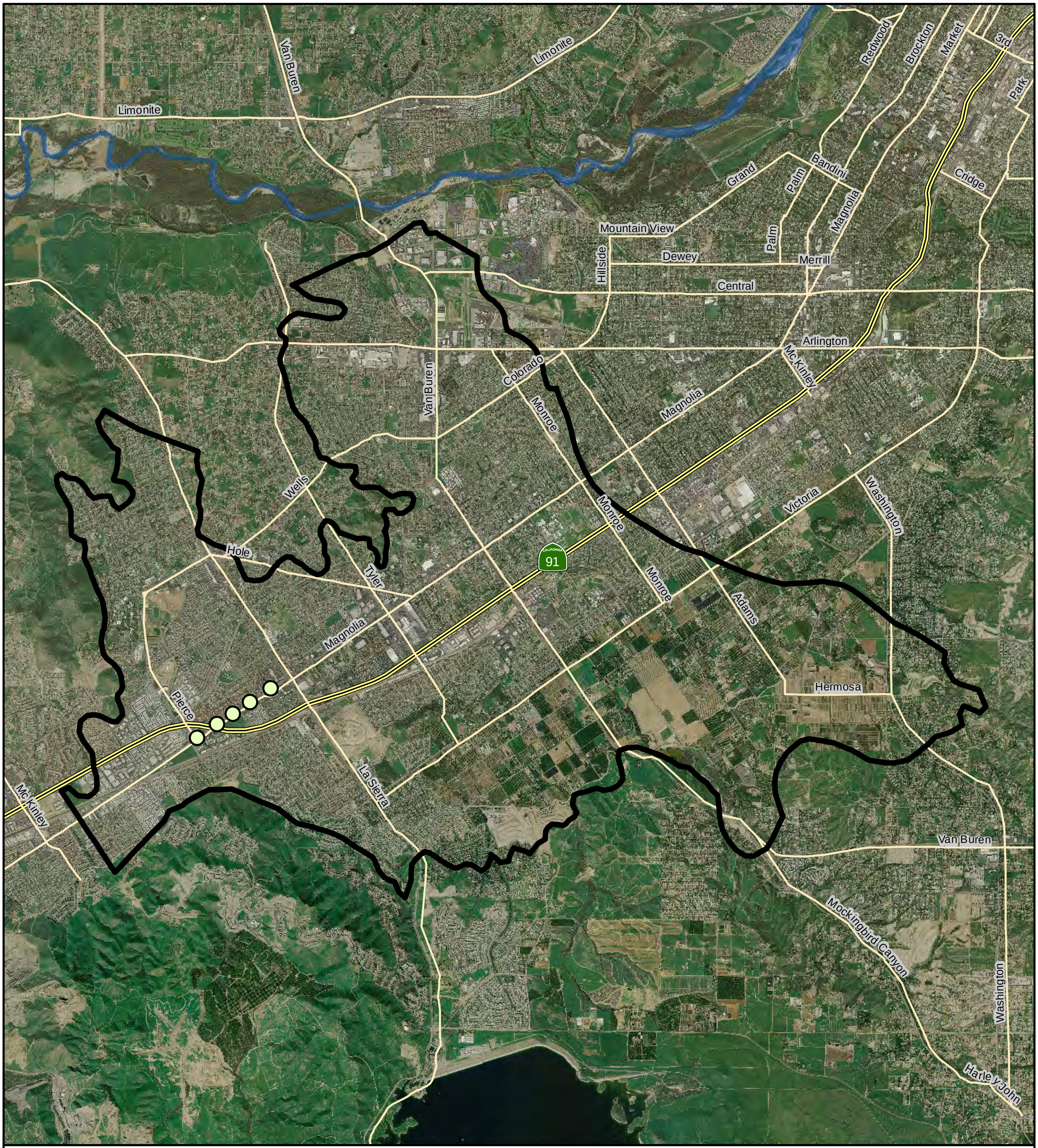
Water quality should be sampled as needed to meet Title 22 requirements, with additional nitrate and total dissolved solids (TDS) sampling to improve analysis needed for compliance and definition of Basin Plan Objectives and to plan for future recharge and desalter projects. A list of wells recently monitored for nitrate or TDS, with well owner, is provided in Tables D-2a and D-2b and shown on Figures D-2a and D-2b. These wells should continue to be monitored and any other relevant wells should be added to the monitoring program.

Table D-2a Wells Monitored for Water Quality, Arlington Basin

AD-1
AD-2
AD-3
AD-4
AD-5

Table D-2b Wells Monitored for Water Quality, Riverside Basin

8th St	Flume 6	RN 17
Agua Mansa	Garner B	RN 20
Center Street Well	Garner C	RN 21
CL-01	Garner D	RN 22
Cunningham 2	Jurupa 7	RN 6
DeBerry	LV 3	RN 7
Electric Street	Moore-Griffith	Russell C Well
Eleventh Street Well	Mulberry	SAR@RRxing
EVMWD Palm	OBO1	Twin Springs
Fill	OBO2	Van Buren 1
First Street	Olivewood 1	Van Buren 2
Flume 2	Palmyrita 1	WVWD 18a
Flume 3	Palmyrita 2	WVWD 41
Flume 4	RIX Site	



Legend

- Groundwater Quality Monitoring Wells*
- Plan Area
- Highway
- Roads

* Groundwater Quality Monitoring Wells are derived from the AWQ Database and have records from 2003 to 2007

N W E S

0 0.5 1 2 Miles

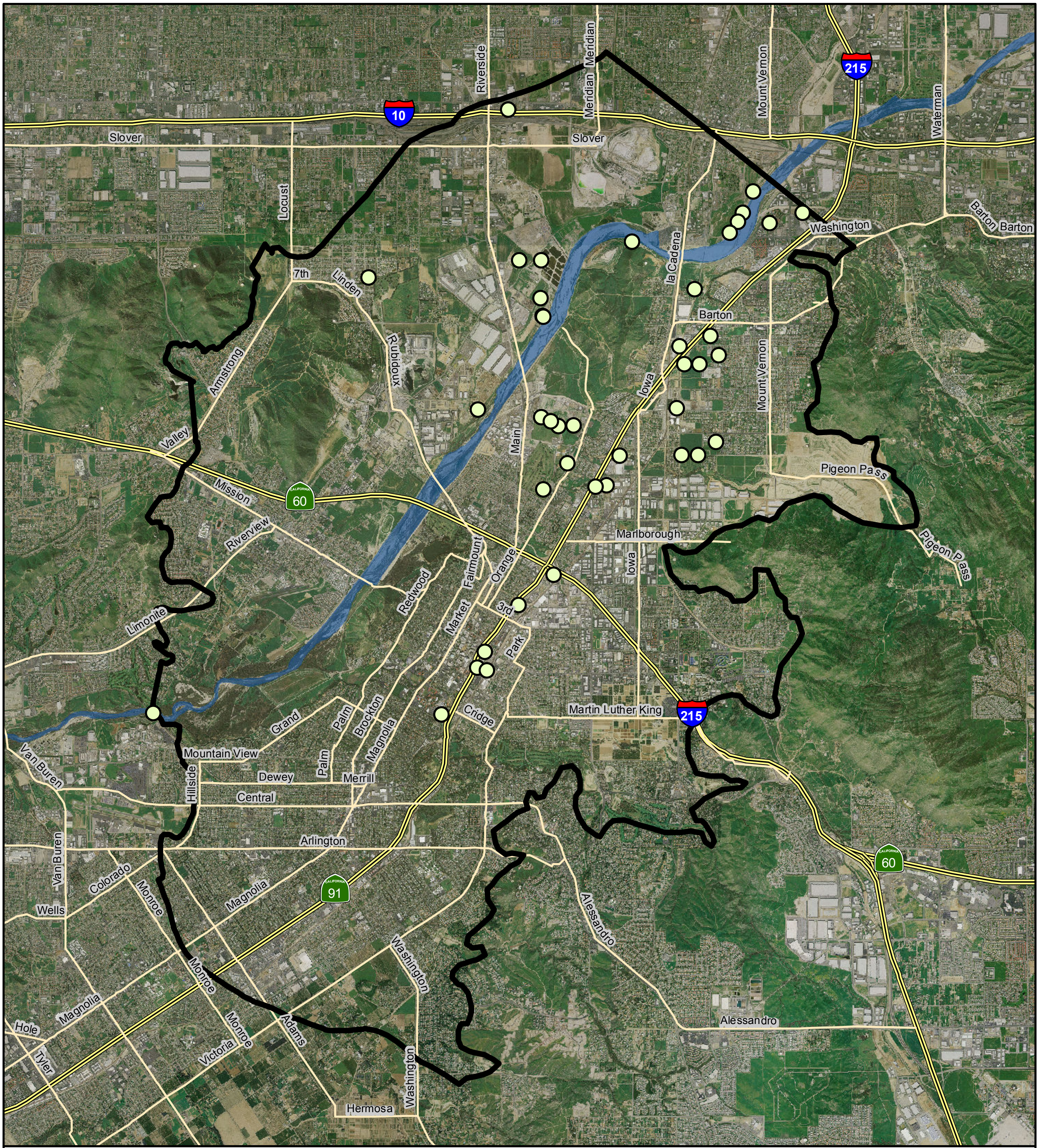
WESTERN MUNICIPAL WATER DISTRICT

Wells Monitored for Groundwater Quality

Arlington and Riverside Basin Groundwater Management Plans

2010

Figure D-2a



Legend

Groundwater Quality Monitoring Wells*

Plan Area

Highways

Roads

* Groundwater Quality Monitoring Wells are derived from the AWQ Database and have records from 2003 to 2007

N E S W

0 0.5 1 2 Miles

CITY OF RIVERSIDE

Wells Monitored for Groundwater Quality

Arlington and Riverside Basin Groundwater Management Plans

2010

Figure D-2b

There are notable deficiencies in TDS and nitrate sampling in the Riverside-D (as defined in the Basin Plan) Management Zone (see Figure 1-7 in the Arlington GWMP or Figure 1-8 of the Riverside GWMP). Additional TDS and nitrate sampling may be beneficial in this area. Additional wells in Riverside-D should be considered for TDS and nitrate sampling. Excluding gas station contaminant monitoring wells that are typically shallow, these wells include:

- Private Wells
  - Laura Lane
- City of Riverside Wells
  - Lincoln Heights
  - Orange Acres

FREQUENCY

It is desired that all available wells be monitored monthly for water levels within the basin. Minimally, water levels should be measured semi-annually, within a month of April 15 and within a month of November 15 of each year. These dates are selected to be seasonally high groundwater levels after the rainy season (April 15 measurement) and seasonally low groundwater levels after the dry season (November 15 measurement). Benefits of monthly measurements over semi-annual measurements is better definition of seasonal highs and lows, as well as better identification of measurement or transcription errors by comparing to the previous and following measurements. Monthly measurements are also useful for detailed analysis, including development and refinement of groundwater models.

METHODS

Details on monitoring methods are available in the USGS National Field Manual at http://pubs.water.usgs.gov/twri9A4/ . A summary of requirements for methods are provided below for both water levels and water quality.

GROUNDWATER LEVELS

Groundwater levels are intended to represent static water level conditions. The procedure for measuring groundwater levels will be as follows:

- Measured wells should have basic information on file, including:
  - Location, with projection information and source (surveyed, GPS, or other method)
  - Elevation of reference point for measurement and ground surface, with datum information and source (surveyed or GPS)
  - Depth from reference point to screen interval
  - Depth from reference point to the bottom of the well
  - Lithology and well construction information
- Measurements should be made by trained, knowledgeable personnel.

- Field forms should have information on previous measurements for context when measuring.
- Turn off well, if applicable, for a period of at least 24 hours. The period required for recovery should be tested through a one-time test with hourly or transducer readings.
- If the well cap is tight and unvented, ensure that water levels are at equilibrium by checking water levels multiple times.
- Measure from the defined reference point to groundwater using an electric water level sounder, steel tape, or a datalogging pressure transducer, to the nearest 0.01 foot. Measure twice to ensure accuracy.
- Clean tapes after use at every well to prevent contamination.
- If using a pressure transducer, data must be corrected for atmospheric pressure if not automatically performed by the device.
- Transducer data must be confirmed with regular hand measurements.
- Record data on a field form, which should include the following information
    - Name of person performing monitoring
    - Date and time
    - Well name
    - Date and time pump was turned off, if applicable
    - Depth to groundwater
    - Equipment used (e.g., sounder, steel tape, portable air line etc.) including specific unit, if applicable
    - Notes, such as odors, wellhead problems, etc.

GROUNDWATER QUALITY

Sampled wells should have basic information on file, including:

- Location, with projection information and source (surveyor or GPS)
- Elevation of reference point for measurement and ground surface, with datum information and source (surveyor or GPS)
- Depth from reference point to screen interval
- Depth from reference point to the bottom of the well
- Lithology and well construction information

Water Level

The water level shall be measured in the well prior to purging or sampling. Clean tapes after use at every well to prevent contamination. See the previous section for methods.

Purging

Sampling shall be performed following purging of the well casing. Low-flow or no-purge techniques may be used, but method must be noted on the sampling results and protocols must be added to this document for consistency across agencies that may want to adopt the same technology.

Purging is important to ensure that the sample represents water quality in the formation surrounding the well, rather than water quality within the well casing, which may not be representative due to materials used in the well construction process or due to differences in environmental conditions, such as oxidation-reduction potential, between the water in the well casing and water in the formation. Purging attempts to remove all standing water in the well casing and replace it with water from the formation. Field monitoring can be performed to establish stabilization of certain parameters, such as pH, temperature, turbidity, and dissolved oxygen, but for simplicity at least 4 casing volumes of water will be purged prior to sampling. The volume of water is intended to remove water in the filter pack in the borehole in addition to the water in the casing itself. The casing volume can be calculated by the following formula:

$$V = 0.0408d^2 * (t - w)$$

Where:

V = volume of water in the casing
d = well diameter [in]
w = depth to water [ft]
t = total depth [ft]
0.0408 = constant that converts units to gallons, and diameter into radius, and incorporates pi.

Purging can be performed using a pump or bailer.

Sampling

After purging, collect the sample using methodology appropriate for the sampler (e.g., pumping, bailing, diffusion bag). Clean all equipment as appropriate.

Field QA/QC Samples

Given the nature of the ambient monitoring needed for the GWMP, these samples may not be necessary unless required by regulatory or court guidelines.

Sampling agencies may adopt Field QA/ QC samples if desired. These samples can include field duplicates, trip blanks, field blanks, and rinsate samples. Field duplicates can be used to estimate the precision associated with sampling procedures. Trip blanks, field blanks, and rinsate samples can help monitor potential contamination from shipment, field conditions, and decontamination procedures, respectively.

Records

Field records include usage of a field notebook and Chain-of-Custody as well as labels for the samples. All items should be completed in blue or black indelible ink. The field notebook should include:

- Name of person performing monitoring
- Well name
- Date and time of sample
- Water level prior to sampling

- Depth to bottom of well
- Calculated volume of water in the casing
- Purge method
- Volume purged
- Analysis required for each sample
- Equipment used (e.g., type of pump and specific unit, if applicable)
- Notes, such as odors, wellhead problems, etc.

The Chain-of-Custody and labels should include:
- Name of person performing monitoring
- Agency name
- Well name
- Date and time of sample
- Analysis required for each sample
- Preservatives in the sample bottle, if any

SHIPPING

Samples requiring shipment to a laboratory will be packaged to avoid damage to the containers and cooled with ice to 4 degrees Celsius if required for the analytical method(s). As the nitrate analysis has a 24 hour holding time, samples will be delivered to the laboratory immediately either by courier or hand-delivered

ANALYTICAL METHODS

Most water quality sampling will be performed for Title 22 compliance and will use the analytical methods prescribed by the Department of Public Health (DPH).

Additional analytes may be added if there are nearby contaminant sources that require analysis for specific contaminants.

LABORATORY QUALITY CONTROL

The laboratory selected for analysis will be certified by DPH and will adhere to

- 21 CFR Part 58, *Good Laboratory Practices*
- Criteria in *Methods for Chemical Analysis of Water and Wastes*, 1983 (EPA-600/ 4-79-020)
- Procedures in SW-846 *Test Methods for Evaluating Solid Waste-Physical/Chemical Methods*, 3rd Edition, 1994
- Criteria in 40 CFR 136 *Guidelines Establishing Test Procedures for Analysis of Pollutants Under the Clean Water Act*

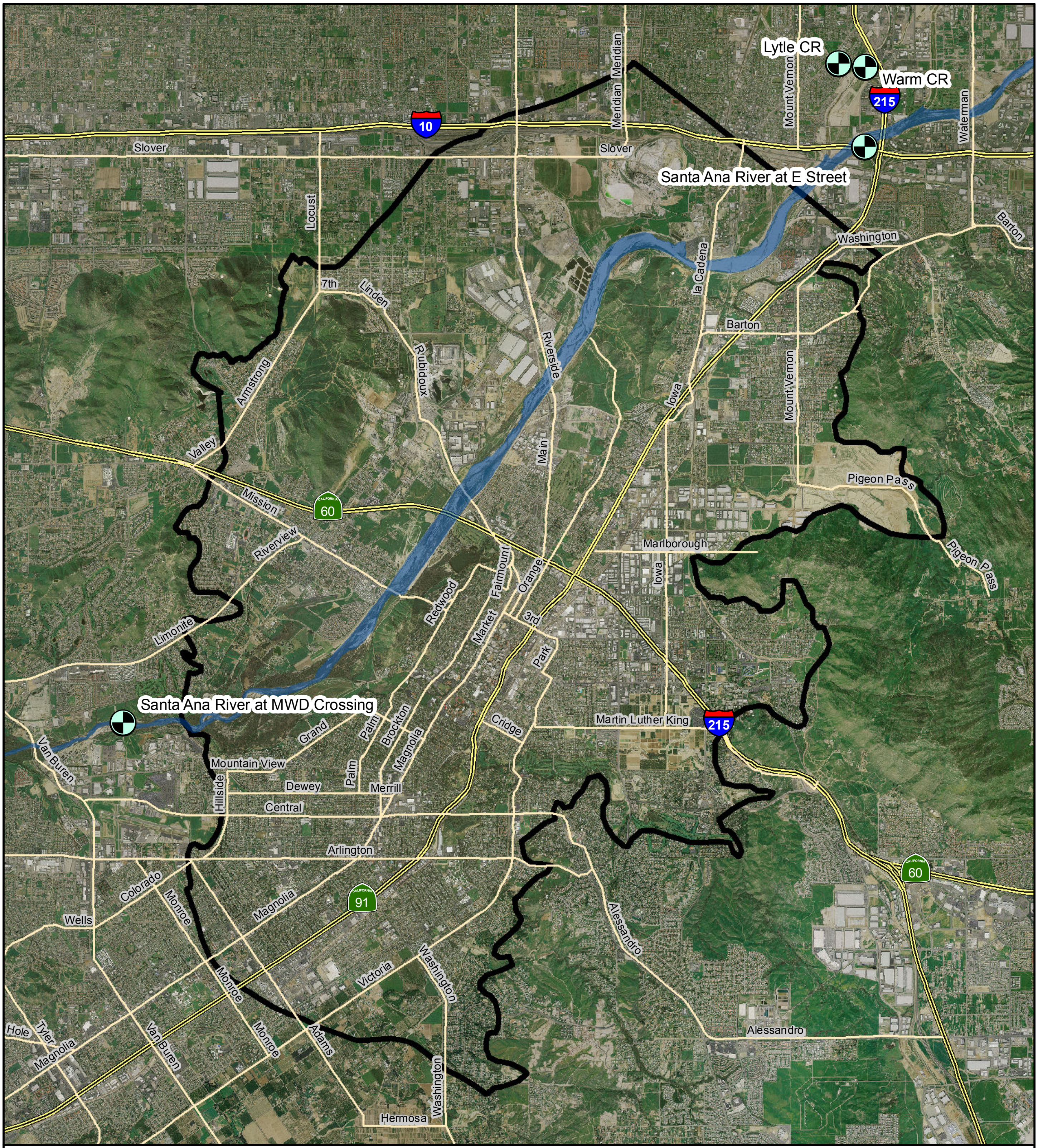
Laboratory quality control will be the standard quality control of the selected laboratory.

While this Groundwater Management Plan focuses on groundwater, surface water is closely linked with both groundwater quality and quantity and requires monitoring to track Basin Management Objectives for the Groundwater Management Plan. The monitoring described in this section focuses on documenting existing surface water monitoring efforts and does not propose new sampling. Should these existing programs cease, efforts may be required to continue collecting the data.

The United States Geological Survey (USGS) operates four Santa Ana River stream gaging stations in and around the basin. Three of the gages are located near the intersection of Interstates 10 and 215 (to the north in the Rialto-Colton Basin) and one is located just downstream of the Riverside Narrows. Two of the three upstream gages are located on tributaries to the Santa Ana River: Lytle Creek and Warm Creek. The Santa Ana River and the four USGS stream gages are shown on Figure D-3. Table D-3 provides location and data availability of the selected USGS stream gages.

Table D-3 Location and Data Availability of Selected USGS Stream Gages

Station No.	Water Course	Location	Available Data		
			Frequency	Start Date	End Date
11059300	Santa Ana River	E Street at I-10	Daily	Mar 1939	Present
11066460	Santa Ana River	MWD Crossing at Riverside Narrows	Daily	Mar 1970	Present
11060400	Warm Creek	Near San Bernardino	Daily	Mar 1964	Present
11065000	Lytle Creek	Colton	Daily	Oct 1957	Present



Legend

- Plan Area
- Highways
- Roads
- Stream Gage

N W E S

0 0.5 1 2 Miles

CITY OF RIVERSIDE

Rainfall and Streamflow Stations

Arlington and Riverside Basins Groundwater Management Plans

2010

Figure D-3

SECTION 4 GROUNDWATER PRODUCTION

Groundwater production is currently monitored by the well owners and reported to the Watermaster who compiles reports on annual groundwater production for the Riverside Basin. Arlington Basin groundwater production is also included in the groundwater extraction database, although the basin does not fall under the 1969 Western Judgment.

Well owners should provide monthly data to the Watermaster for inclusion in the database. While reporting by the Watermaster will continue at the annual level, the monthly data will be available for water resources planning efforts as needed by the cooperating well owners.

SECTION 5 LAND SUBSIDENCE

Monitoring for land subsidence is under consideration for future activities. Monitoring may include land surveys, extensiometers, or Satellite Interferometric Synthetic Aperture Radar (InSAR).

United States Geological Survey. 2006. *National Field Manual for the Collection of Water-Quality Data (TWRI Book 9) Chapter A4. Collection of Water Samples (Version 2.0).* September, accessed 6/7/10 at: http://pubs.water.usgs.gov/twri9A4/.